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The Mining Journal,

RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

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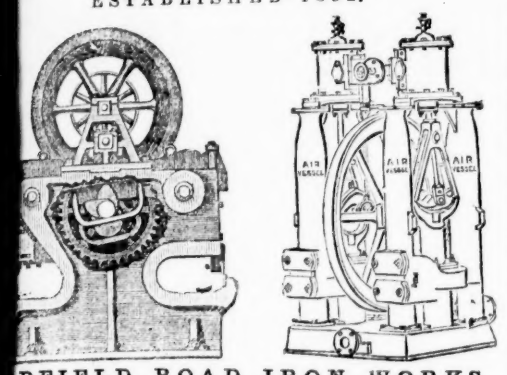

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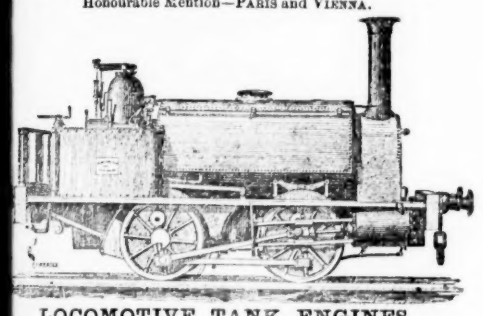

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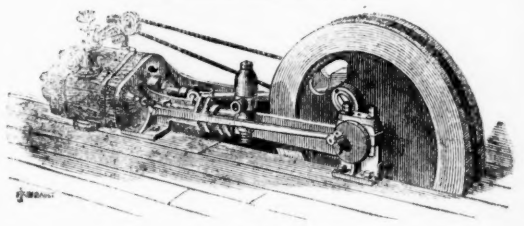

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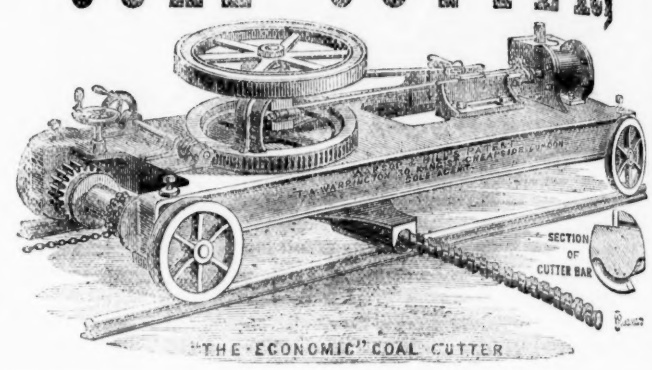

Patent No. 4136 - - - - - Dated 16th December, 1873.
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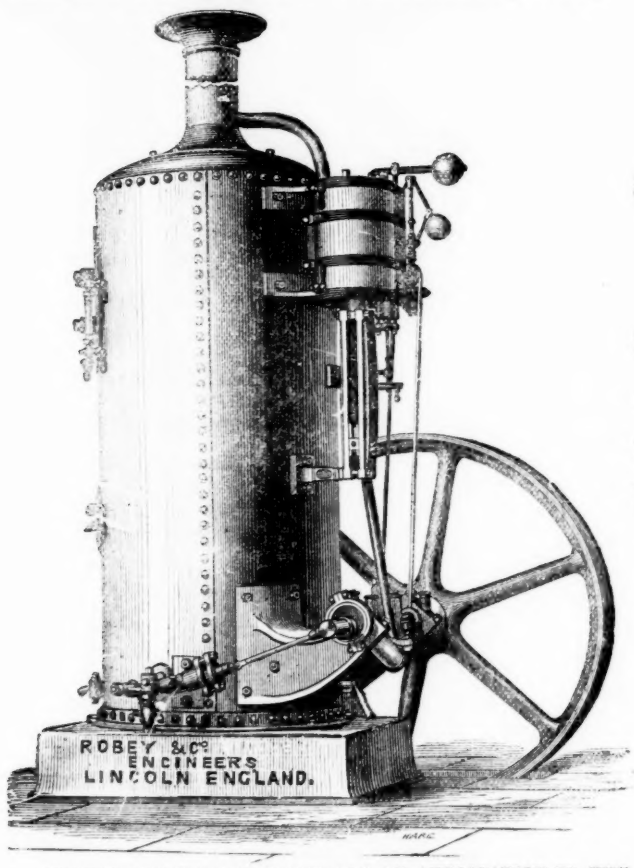

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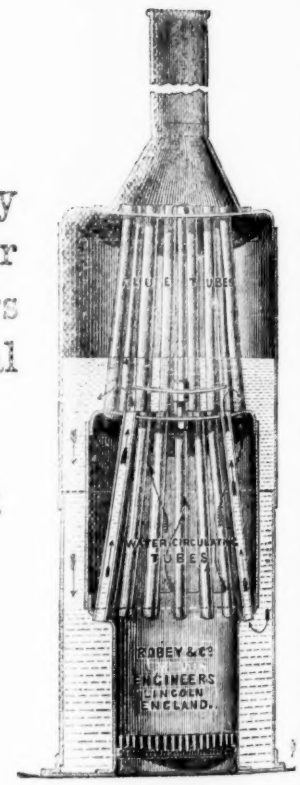

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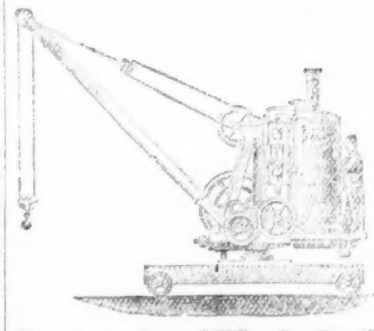

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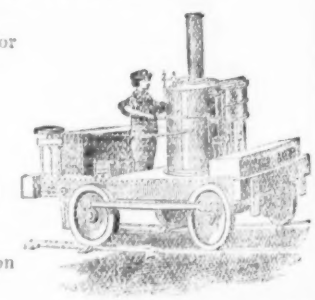

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THE IRON INDUSTRIES OF GLOUCESTERSHIRE, FOREST OF DEAN.

By RICHARD MEADE, Assistant Keeper of Mining Records, Museum of Practical Geology.

PIG-IRON MANUFACTURE.—The Forest of Dean has for many centuries been associated with the iron manufactures of Great Britain, in many localities in the Forest, near the sites selected by the Romans for the erection of their altars dedicated to Mars, the god of battle, numerous remains of scoriæ or slags have been found, and containing so large an amount of metallic iron, that for many generations it has been found profitable to re-smelt them. In other districts in this country similar remains have been discovered—as, for example, at Bierley, near Bradford, in the West Riding of Yorkshire, and again on the Brendon Hills, in Somersetshire. It is stated that during a period of three centuries about 20 small charcoal furnaces existed in the Forest of Dean, engaged in the re-smelting of these rich slags, said to contain from 30 to 40 per cent. of metallic iron. It is no less remarkable that it was on the hills that these Roman slags were invariably discovered, leading to the inference that bellows were not then employed, but that the furnaces were so constructed as to utilise the wind by suitable channels, through which it was conducted, always taking advantage of the prevailing wind. These furnaces, or air bloomeries, were hollows dug out at the top of a hill, with covered channels leading to the hillside in the direction of the prevailing wind, which would blow through them into the fire, the latter being kept up with wood or charcoal, the iron ore being introduced into the burning mass. The early process thus referred to was of a very primitive character, and was attended with very great loss of metallic iron remaining in the rejected slags. Similar air furnaces, it is stated, were employed in Derbyshire in the 17th century for the reduction of the ores of lead. As soon as bellows were introduced, about the 8th century, a new impulse was given to the iron industries generally; instead of hollows these so-called bloomeries were built up walls, which were gradually heightened till they attained an elevation of from 5 to 6 ft., the diameter also augmenting to 3 and 4 ft., thus becoming wolf furnaces, and furnaces of this description were employed in America and Hungary until less than 100 years ago, and are now in use at the present time in the East in India and Turkey. Originally these furnaces were rectangular in form, but after the 16th century they became elliptical, and eventually in the last century circular in section. They were not, however, in such a condition as to produce a fusible cast iron, as they could only deliver lumps, "wolves," or pigs of half malleable wrought-iron. Previous to the introduction of bellows, as already stated about the 8th century, we find the valleys selected for the sites of blast furnaces or bloomeries, where water power was obtainable, and could be made available as a motive power in impelling the blast; with this change the manufacture was carried on under more favourable circumstances.

In the Forest of Dean, about the beginning of the 16th century, charcoal blast-furnaces, it appears, were introduced from the iron districts of the Rhine, these furnaces were 6 ft. wide at the boshes and 15 ft. high, and we have the authority of Mr. David Mushet, who found the remains of two such furnaces, having probably been built during the reign of Edward IV., and about the year 1550. Again, in the reign of Elizabeth, it is known that the art of iron casting had in this country attained a certain degree of perfection, as cast-iron ordnance were then largely exported to the Continent, and the annual production of charcoal pig-iron at this period was estimated at not less than 180,000 tons per annum. The great drain on our forests at a subsequent period to furnish the fuel—charcoal—for the reduction of the ores of iron in the blast-furnace nearly brought the iron industries of England and Wales to a standstill; indeed, not less than three fourths of the blast-furnaces then erected were inactive about the year 1740, when the production of the country had diminished to 17,350 tons of pig-iron.

Not until the year 1740 have we any date to fall back upon showing the production of pig-iron in the Forest of Dean, although ample evidence exists of the industry being carried on at a very much earlier period; dealing, however, with the statistical facts at our disposal, and referring to the year 1740, we find in Gloucestershire, presumably in the Forest of Dean, four furnaces producing 800 tons of charcoal pig-iron, being an average make of 200 tons per furnace. A century later—in the year 1840—there does not appear any increase in the number of blast-furnaces in operation, but, on the other hand, those furnaces show a greatly increased capacity, the average yield of each furnace in the year 1840 being 3875 tons, as compared with 200 tons the yield of the furnaces in the year 1740.

For reference and comparison we give the respective returns of production of pig-iron made in Great Britain in each of the years 1740 and 1840, as follows:—

Districts.	1740. Furnaces in blast.	1740. Pig iron. Tons.	1840. Furnaces in blast.	1840. Pig iron. Tons.
Derbyshire	2	550	13	31,000
Gloucestershire*	4	800	4	15,500
Hampshire	3	1,350	—	—
Kent	1	200	—	—
Northumberland	—	—	5	11,000
Nottinghamshire	1	250	—	—
Shropshire	6	2,100	24	82,750
Staffordshire, North	3	1,700	7	20,503
Staffordshire, South	2	1,000	116	407,151
Scotland	—	—	64	241,000
Sussex	10	1,400	—	—
Wales, North	4	400	12	28,500
Wales, South	13	4,850	132	505,000
Warwickshire	2	700	—	—
Worcestershire	2	700	†	†
Yorkshire	6	1,400	25	56,000
Total	59	17,350	402	1,396,400

* Or Forest of Dean. † Included in South Staffordshire.

Charcoal, as previously stated, was employed in the Forest of Dean furnaces in the year 1740; its use was continued for some years later, for we find that in 1788 there was produced of charcoal pig-iron 2600 tons, the yield of four furnaces, being an average of 650 tons per furnace. The total make of the 24 furnaces in England and Wales the same year being 13,100 tons, or an average of 545 tons per furnace; while of 53 furnaces in England and Wales in the same year the make of coke pig iron was 48,200 tons, or an average yield per furnace of upwards of 900 tons.

The details of production of our iron making districts in the year 1788 will be found in the following abstract:—

District.	Charcoal pig. No. of furnaces.	Charcoal pig. Tons.	Coke pig No. of furnaces.	Coke pig Tons.
Brecknockshire	—	—	2	1,600
Carmarthenshire	1	400	—	—
Cheshire	—	—	1	600
Cumberland	1	300	1	700
Derbyshire	1	300	7	4,200
Glamorganshire	3	1,300	6	6,600
Gloucestershire	4	2,600	—	—
Lancashire	3	2,100	—	—
Merionethshire	1	400	—	—
Monmouthshire	3	2,100	—	—
Shropshire	3	1,800	21	23,100
Staffordshire, South	—	—	3	2,400
Staffordshire, North	—	—	6	4,500
Sussex	2	500	—	—
Westmoreland	1	400	—	—
Yorkshire	1	600	6	4,500
Total of England and Wales	24	13,100	53	48,200

The above districts of England and Wales give a total production of 61,300 tons of charcoal and coke pig-iron, the yield of 77 furnaces. To this must be added the production of the furnaces in Scotland, which amounted in the same year (1788) to 5600 tons of coke pig-iron and 1400 tons of charcoal pig-iron. The Scotch furnaces in existence at this period were those of Messrs. Harrison, Ainslie, and Co., who had two charcoal furnaces in the Western Highlands, one at Goatfield and another at Bunawe, each producing about 700 tons per annum. There were also at this time at the Carron Works four furnaces making pig-iron with coke, and two furnaces at Wilsonstown and Cleagh similarly engaged. Thus, in the year 1788 the total production of pig-iron amounted to 68,300 tons, as follows:—

	Charcoal pig.	Coke pig.
England and Wales	Tons 13,100	Tons 48,200
Scotland	1,400	5,600
Total	14,500	53,800

Mr. David Mushet, writing in reference to the iron industries of the year 1788, states that in addition to the furnaces employed in the manufacture of, pig-iron there were no less than 60 melting refineries for working with coke, making not less than 15,600 tons of iron per annum, and using not less than 100,000 tons of coal, which, when taken with the 376,000 tons of coal used in the manufacture of pig-iron, gives a total of from 476,000 to 500,000 tons of coal coked and used in iron manufacture in the year 1788. This quantity becomes insignificant when compared with the quantity of coal used now-a days in our iron industries, which amounted in the year 1874 to 15,292,201 tons in the production of 5,991,408 tons of pig-iron, a further quantity of coal amounting to 18,270,150 tons being consumed in the manufacture of bar-iron or merchant iron, or a total of 33,562,351 tons of coal used in our iron industries in 1874.

The introduction of blowing machinery, about the middle of the last century, exercised an important influence on the iron industries of the country, giving a fresh impulse to the manufacture of pig-iron with coke, and supplemented Abraham Darby's application of its use in the blast-furnace. Smeaton led the way in this direction, when, in the year 1760, he erected his first cylinder blowing-engine at the Carron Ironworks, situated near Falkirk, in Scotland. This invention enabled the ironmaster to ensure considerable economy, by consuming the hard dense coke which the ordinary bellows previously employed did not effect, and, further, the capacity of his furnaces for increased production was greatly augmented.

Advancing to the year 1796, when the number of blast-furnaces in England and Wales amounted to 104, and the production of pig-iron to 167,321 tons, there existed but two blast-furnaces in the Forest of Dean, the annual yield of which did not exceed 380 tons of pig-iron. The total production of pig-iron in Scotland in the same year is stated to have been 16,086 tons, the yield of 17 furnaces. We thus learn that in the year 1796 the total production of pig-iron in Great Britain amounted to 183,407 tons.

At the end of the last and beginning of the present century it is quite certain that the iron industries of Great Britain were far from being in a prosperous condition—indeed, it has been stated by some writers that at the period referred to the iron trade of the Forest of Dean was nearly at a standstill. Other periods of depression ensued, while in later years more prosperous times succeeded, and when about the year 1826 the works and furnaces at Parkend commenced operations, a new era was inaugurated—the works at Parkend were devised and carried out by Mr. Moses Teague, who at a later period inaugurated with equal ability and success the works and furnaces at Cinderford. The above-named gentleman has the distinction of being the chief agent in promoting the successful development of the iron industries of Dean Forest. From the year 1796 considerable obscurity surrounds the progress of iron manufacture in the Forest of Dean, and not until the year 1839 do we find it appearing in the returns as an iron-producing district, when it appears that the pig-iron made amounted to 18,000 tons, the furnaces in operation being those of the Parkend and Cinderford Companies, the former having three and the last-named two blast-furnaces in operation, giving an average yield per furnace of 3600 tons. The return above referred to was prepared by Mr. David Mushet, who made a survey of the iron industries in the United Kingdom for the year 1839, and ascertained the then condition of our ironworks, and their production of pig-iron, as recorded in the annexed table:—

Districts.	Number of furnaces. In blast.	Cut.	Building.	Pig-iron made. Tons.
Durham and Northumberland	5	—	—	13,000
Gloucestershire (Forest of Dean)	5	3	2	18,000
Derbyshire	14	2	2	34,372
Lancashire (charcoal)	2	—	—	800
Scotland (charcoal)	1	—	—	400
Staffordshire, North	7	3	3	18,200
Staffordshire, South	120	106	—	346,213
Shropshire	29	5	—	80,940
Wales, North	13	7	—	33,800
Wales, South (anthracite)	23	3	11	65,780
Wales, South (bituminous)	99	2	21	388,100
Yorkshire	24	5	—	52,416
Scotland (bituminous)	54	6	18	196,560
Total	396	242	57	1,248,581

It may here be mentioned that it was Mr. David Mushet who made the discovery of the important deposits of blackband ironstone in the Scotch coal fields, an important source of the development of the iron industries of Scotland in recent years, though now the blackband is being rapidly exhausted. This blackband ironstone is a valuable form of the ore, and usually contains sufficient carbonaceous matter to effect its calcination without the aid of additional fuel. The ore was discovered by Mushet in the Lanarkshire coal field about the year 1801, it was not, however, till about the year 1830 that it came into general use. It is a clay-ironstone of a dark brown or black colour, containing from 30 to 40 per cent. of metallic iron, and from 25 to 30 per cent. of carbonaceous matter.

The yield of this ironstone per acre, of a thickness of 1 ft., is at the rate of about 2000 tons of calcined ore. The thickness of the blackband deposits of ironstone is very variable, a band seldom occurring over very large areas, without some change taking place in its composition. The supply of this variety of iron deposit has fallen off considerably of late years in Scotland; in other districts, however, a greatly increased production of hematite is observable, as, for example, the West Coast deposits of Lancashire and Cumberland, the former averaging 64 per cent., and the latter 66 per cent. of metallic iron; the Forest of Dean hematite deposits, at present but partially developed, and containing from 35 to 63 per cent. of metallic iron, and from which greatly increased supplies will doubtless be derived in future years, as the demand may arise with returning prosperity to the iron industries of the kingdom. To the above districts and foreign countries our ironmasters will doubtless direct their attention as a source of future supply for the higher class ores of hematite. Again, in the year 1840 the yield of the Forest of Dean furnaces is recorded as 15,500 tons. The details of production for this last-named year will be found above, side by side, with the returns of Great Britain for the year 1740.

In some of our previous notices we have referred to the many valuable inventions and discoveries tending to increased production; the most important of these in this century was that of Mr. James Beaumont Neilson, who successfully applied the hot-blast in the year 1828 in the smelting of the ores of iron at the Clyde Ironworks, near Glasgow. This invention more especially led to increased production, Scotland taking the lead in this direction. The return of pig-iron manufacture in Scotland for a few years will prove instructive, and serve as an example of progress:—

Years.	Pig-iron.	Years.	Pig iron.
1820 ....Tons	20,000	1865 ....Tons	1,164,000
1840	241,000	1870	1,206,000
1845	475,000	1871	1,160,000
1850	595,000	1872	1,090,000
1855	825,000	1873	993,000
1860	1,000,000	1874	806,000

The statistics of the Scotch iron trade for the year 1875 show increased activity, the yield of pig-iron being greatly in excess of the previous year, the actual make in the year 1875 being 1,050,000 tons, compared with 806,000 tons in the year 1874. While of the 155 furnaces built in Scotland, 114 were in blast, giving an average make per furnace of 9210 tons in the year 1875. In the same year the average price of Scotch pig-iron per ton was 65s. 9d., compared with 87s. 6d. in the year 1874, and 117s. 3d. in the year 1873.

The production of the Cleveland district in the year 1875 amounted to 2,047,763 tons, exceeding the make of the previous year by 46,530 tons; ten years since the production of the district was 957,311 tons, the number of furnaces built in the Cleveland district, which in the returns include the furnaces of Durham and Northumberland, being 159, of which 116 were in blast; the yield of these furnaces give an average make in the year 1875 of 17,653 tons, distinguishing their greatly increased capacity when compared with the blast-furnaces of Scotland. The average price of Cleveland pig-iron in the year 1875 was 54s. 10d. per ton, compared with 68s. 9d. in the year 1874, and 106s. 6d. in the year 1873.

To resume with the Forest of Dean, we have it on the authority of Mr. Samuel Blackwell that the annual production of this district amounted in the year 1851 to 30,000 tons of pig-iron, the make of five furnaces. The Darkhill and Oakwood Vale furnaces were in course of erection about this period; the former by Messrs. Mushet; the latter by the Ebbw Vale Iron Company, and in the year 1855 the Soudley furnaces were erected by Mr. B. Gibbons, jun. We will now follow the industries of this district, showing the number of furnaces built and in blast from the year 1854 to 1863, and side by side the total production of Great Britain in each of the same years:—

Year.	Forest of Dean. Furnaces. Built.	Furnaces. In blast.	Pig-iron. Tons.	Great Britain. Pig-iron. Tons
1854	7	5	21,990	3,069,838
1855	7	4	19,500	3,218,154
1856	10	5	24,132	3,586,377
1857	10	5	23,882	3,659,447
1858	10	4	23,580	3,456,064
1859	10	6	31,750	3,712,804
1860	9	4	26,458	3,826,752
1861	9	3	23,163	3,712,800
1863	9	6	39,427	4,510,040

Subsequently and until the year 1872 we find the Forest of Dean returns included with those of Wiltshire and Somersetshire. The following abstract shows the production in the aggregate of these districts, from which it may be inferred that the Forest furnaces produced nearly two-thirds of the total quantity in each of the following years:—

Year.	Forest of Dean. Furnaces. Built.	Furnaces. In blast.	Wiltshire. Furnaces. Built.	Furnaces. In blast.	Somersetshire. Furnaces. Built.	Furnaces. In blast.	Total Pig iron. Tons.
1864	9	6	3	3	2	1	45,312
1866	10	6	3	3	2	1	59,817
1868	10	6	4	3	2	1	75,847
1870	10	7	5	4	2	1	93,509
1871	9	7	5	5	2	1	99,397

The returns for the years 1872, 1873, and 1874 distinguish the production of pig-iron made in the Forest of Dean furnaces, which amounted to the following quantities. The make of the furnaces of Great Britain will be found side by side, for comparison, in each of the same years:—

Years.	Forest of Dean. Furnaces. Built.	Furnaces. In blast.	Pig-iron. Tons.	Great Britain. Furnaces. Built.	Furnaces. In blast.	Pig iron. Tons.
1872	10	6	46,226	874	702	6,741,828
1873	10	6	44,049	862	683½	6,566,450
1874	10	6	43,139	935	649	5,999,402

The annexed list of works and furnaces will show the present resources of the Gloucester and Somerset districts, with the number of furnaces built and in blast in the year 1874:—

Works.	Owners.	Furnaces. Built.	Furnaces. In blast.
GLOUCESTERSHIRE.			
Cinderford	Henry Crawshay and Co.	4	3
Oakwood	Ebbw Vale Company	1	0
Parkend	Forest of Dean Iron Co.	3	2
Soudley	Goold Brothers	2	1
Total of Forest of Dean		10	6
SOMERSETSHIRE.			
Ashton Vale	Ashton Vale Iron Co. (Limited)	1	1
Gross total		11	7

Commercial reports from these districts are general in stating that short time prevails in the works, that orders are scarce, and prices unremunerative, and but little immediate prospects of revival; this depression, with but few exceptions, is general in our iron-producing districts. The Trade and Navigation returns for the first quarter of the present year present some interesting and instructive facts bearing upon the present state of our coal and iron industries, as exhibited in their exports, this will be seen in the details that will follow. These returns show a large increase in our exports of coal, as compared with the corresponding periods of the two previous years, the low prices ruling in our coal districts leading to increased exports; indeed, it has been affirmed that for some months past, in many of our coal-producing districts, coal has been wrought with a very small margin of profit, barely paying expenses, and there is good reason to believe this statement. Here, however, will be found the quantities and countries receiving the principal exports of our fossil fuel during the quarter ending March, 1876, and corresponding quarters of the two previous years:—

Countries to which exported.	Quarter ending March. 1874—tons.	1875—tons.	1876—tons.
Russia	54,051	29,315	82,363
Sweden and Norway	136,287	92,524	117,004
Denmark	143,472	86,079	110,360
Germany	292,468	198,188	267,171
Holland	65,595	53,588	63,036
France	610,713	611,764	884,250
Spain and Canaries	198,582	153,576	188,430
Italy	231,581	190,004	283,112
Turkey	79,427	38,974	80,273
Egypt	159,100	112,367	230,806
Brazil	94,835	64,037	67,342
Malta	88,908	49,492	57,815
British India	95,206	111,277	126,584
Other countries	618,076	674,465	716,516
Total	2,896,580	2,446,443	3,165,404
Value	£ 2,899,417	£ 1,491,634	£ 1,840,831

An examination of the above figures gives the average value of coal of all kinds exported from the United Kingdom in the periods referred to as exceeding 20s. per ton in 1874, receding to 15s. per ton in 1875, and in the first quarter of the present year a further fall in value appears, the average not exceeding 11s. 6d. per ton.

Of the coal, &c., shipped for the use of steamers engaged in the foreign trade a large increase is shown, the actual quantities being as follows:—

	1874.	1875.	1876.
Quarter ending March ... Tons	726,001	721,554	891,676

IRON AND STEEL EXPORTS.—Here again the Trade and Navigation returns exhibit in a very marked manner the extent to which our iron and steel industries have of late been affected. Taking the aggregate exports and values under the above head, including all kinds of iron and steel, we find the quantities as follows for the first quarter of the year 1876; side by side will be found the figures for the corresponding quarters of the two previous years:—

	1874.	1875.	1876.
Quarter ending March ... Tons	493,583	473,569	418,512
	£7,021,345	£5,698,265	£4,458,532

Thus comparing the exports of the March quarter of the year 1876 with the corresponding quarter of the previous year the difference in quantity amounts to 55,050 tons, and in value to 1,239,726*l.*; while comparing the same quarters in the years 1876 and 1874 the falling off is still greater, to the extent of 75,064 tons, the difference in value amounting to 2,562,806*l.*

The following abstract gives in detail the quantities of iron and steel of all kinds exported in each quarter ending March of the years 1874, 1875, and 1876:—

Description of iron, &c.	Quarter ending March. 1874.	1875.	1876.
Pig-iron ....Tons	141,768	165,613	153,186
Bar, angle, bolt, and rod	54,064	57,058	53,762
Railroad of all sorts	159,303	102,634	63,618
Wire of iron or steel	6,707	11,610	11,906
Hoops, sheet plates, &c.	31,736	43,205	42,464
Tin plates	34,872	37,242	30,966
Cast or wrought	52,920	44,693	51,162
Old iron	3,924	2,804	3,574
Steel, unwrought	6,446	6,404	5,720
Manufactures, &c.	1,843	2,314	2,102
Total of iron and steel	493,583	473,569	418,512

The principal falling off in our iron exports, as will be seen by the above figures, appears under the head of railway iron of all kinds, which fell from 159,303 tons in 1874, to 63,168 tons in the March quarter of 1876.

Further, it is ascertained that the average value per ton of railroad iron of all kinds exported in the year 1874 amounted to 12*l.* 6s. 3d., compared with 9*l.* 19s. 3d. in the year 1875, while for the March quarter of the present year the average value of the same description of iron has receded to 9*l.* 1s. 4d. per ton. These figures indicate sufficiently the depression which for the time surrounds these important branches of our national industries as exhibited in our iron exports.

In a future notice an account of the malleable ironworks of the Forest of Dean will be given, following with details of the ores and fuel employed in the manufacture of pig-iron and tin-plate, and an account of the last-named industry.

METALLIC ALLOYS.—Some improvements in metallic alloys or compounds for protecting iron surfaces, and in separating and evaporating apparatus to which such alloys are applied to protect the same from oxidation or corrosion, have been invented by Mr. O. HOLDEN, of New York. The invention relates to, first, the production of an alloy of metals or alloys of metals which are in themselves

electro-positive and electro-negative to iron, or some may be electro-positive to the iron, and one or more electro-negative to the other; secondly, improvements in separating or evaporating apparatus; thirdly, an evaporating apparatus, which may be rendered exceedingly effective by the use of said alloys.

Original Correspondence.

MINING ON THE PACIFIC COAST—No. I.

SIR,—Nothing very remarkable has transpired in the silver-producing regions of the Far West since I addressed the Journal in June, 1875, from Tybo, that necessitates the penning of any extended remarks, since the developments that have been carried out in the various districts heard from have not come quite up to the standard of public expectation. The Mining Bohemian though, who erratically swings round the circle with his Faber and note-book in hand, ready to interview some prospective Rothschild fresh from the mountains, may, and doubtless has, given to far-distant journals the reverse of the above picture. But highly-coloured fanciful sketches will not do; the day has forever passed when such nonsense would be tolerated by the public. The British people, who are far removed from the scene of active operations, are likely enough often misled by flaming reports published from time to time of "strikes" and grand results, which, upon proper enquiry being instituted, were proved to be as mythical in character as has been the bonanza which the erudite Silliman foretold would sometime be evolved from amidst the debris and circumjacent limestone of the now too-famous Emma.

Outside of the bonanza mines on the Comstock there has not been a great deal done in the way of opening up new ground—particularly productive ground—that would enrich the mining annals of 1875-76, or that would entitle these years to any greater prominence in the mind of the miner than has been accorded to those that have preceded them. The Consolidated Virginia, California, Ophir, and neighbouring mines are, of course, among the *ne plus ultra* of mining properties, and every day and every foot of virgin ground that yields to the pick of the miner increases this wealth and importance. The aggregate returns of the former for the month of March footed up $3,000,000, and of this stupendous sum $1,080,000 were disbursed to its lucky shareholders. The original stock has, however, been pretty well watered since then, five shares having been given for one share of the old issue, which thus places the present issue at 540,000 shares, upon which a dividend of $2 per month is paid. California has a like number of shares; therefore, at their present market value, this mine has a money value of $43,200,000—while the Virginia Consolidated, owing to a strong "bear" movement, has fallen to $38,880,000, showing a reduction in value of not less than $5,400,000 in the short space of two weeks. This depreciation will give some idea of the ursine funge, and of the onslaught that has been made of late upon the heretofore jubilant "bulls" by their shaggy opponents. Not since the disastrous conflagration which occurred towards the latter part of last October, laying in ruins the greater and more populous quarter of Virginia City and the expensive plant of many of the most noted mines in the immediate vicinity, has there been exhibited so general a falling off in prices as exists at present, yet the various mines called on 'Change appear to be as productive as ever they have been at any time within the past year, and a few of them are known to be yielding up their treasures largely in excess of previous returns. That fire laid waste nearly all of the business portion of the city, and caused a temporary suspension of many important undertakings, and also a loss of $5,000,000 or $6,000,000 to the three companies referred to above. From the partial chaos which necessarily ensued one would reasonably suppose that few dividends would be paid in the interim between the catastrophe noted and the period of the completion of repairs and the resumption of work; but in this he would be mistaken, for so large was the reserve fund that had been accumulated by the Consolidated Virginia Company that no suspension of its monthly dividends took place—and so quickly was the damage repaired, shafts newly timbered, hoisting-works rebuilt, and water-pipes put in place that no serious stoppage of the outflow of bullion was visible, or, if so, was felt, work, ore extraction, &c., having been fully resumed in the short space of two months from the occurrence of the disaster aforesaid. What can give more satisfactory evidence, if such were wanted, of the wonderfully recuperative resources, skill, and energy displayed by the Comstockans than is here given? Everything has moved apace since then, so that now Virginia city presents in the matter of public and private structures a much more substantial appearance than it did previous to the descent of the fire fiend upon it.

Although there have been no extensive mineral discoveries reported from any of the outlying districts of Nevada within several months the outlook is still very encouraging, and a larger yield of the precious metals is looked for towards the end of 1876 than has been shown at the close of 1875. From an exhibit of the figures reported by Mr. Valentine, the General Superintendent of Wells, Fargo, and Co.'s Express, the total value of the gold and silver produced last year by the States and Territories west of the Missouri river aggregated $76 703 413; but to this sum there should be added the product of Mexico and British Columbia and New Mexico, and also we should take into account the other channels through which bullion finds its way to San Francisco from interior small mining enterprises, in order to arrive at a proper estimate of the gross returns for 1875, which cannot fall far short of $81,000,000 or $82,000,000. Nevada's proportion of this amount was $40,478,339, while California shows a falling off of more than $2,500,000 from the previous year. This decrease is, however, due entirely to the shortness of the water season during that year, and to the extremely cool weather which set in in the early part of it, and not to any diminution of the gold dust known to exist in the hydraulic mines of the State. Any curtailment of the aqueous element works no inconsiderable injury to the interests of mining properties of this class.

The stoppage of the Union Mine, Cerro Gordo District, Inyo County, too, for close on nine months very materially contributed towards diminishing the yield of the State for that year. By reason of vexatious litigation there was thus lost half a million of dollars, and there are many truly valuable mines lying in a state of inertia and unproductiveness throughout both California and Nevada from the same lamentable causes; but mining lawsuits, at one time so grand a source of revenue to the many second-rate impecunious lawyers that swarmed like hungry cormorants in every prominent mining centre of the Coast, are no longer considered either lucrative or fashionable, and, consequently, are not indulged in to the extent that they formerly were, to the great disgust of the gentlemen of the long robe. Such matters are now adjusted without recourse to the Courts; but there are still found exceptional cases, to decide which the aid of the law is frequently invoked.

The year 1875 was chiefly remarkable for the development of the big bonanza, and for the extensive preparations that were in every quarter carried out and perfected without regard to cost for the resumption of operations in mining on a scale commensurate with the importance of the interests at stake. There were many promising enterprises inaugurated, and many costly improvements that had been but half finished have been advanced to completion. The mechanical inventions, too, were quite numerous, and not the least interesting of them were those that had for their object the cheapening and simplifying of labour pertaining to milling and mining in their various branches. There were also many metallurgical processes introduced to the notice of the public, a few of which are deemed worthy of attention. Among these may be mentioned the Fryer process, invented and highly perfected to his own and the satisfaction of the numerous scientists of the Coast who have examined it, and who pronounce it paramount to anything that has heretofore been brought before the public for the reduction of that class of our ores denominated "rebellious." Such ores are found in large quantites in both Calffornia and Nevada, and Mr. Fryer can afford to feel proud of having invented that which, with but little cost and trouble, has shown itself capable of mastering them, by extracting from them every particle of the precious metals which they contain.

This gentleman, while pursuing his expensive and difficult operations with a view to the perfection of his scheme, and an exhibition of a fuller knowledge of the principles upon which it is based, has been actuated from the first by very worthy and conscientious motives. Such actions are all the more creditable when the difficulties which had to be surmounted at every forward step are duly considered. He had not alone to provide the means to furnish the plant, buildings, &c., by which and whereon to operate while carrying out his investigations, but, worse, he had to bear calmly with the abuse and misrepresentations of an erratic press and public, because he did not sooner make known the practical and theoretical secrets of his great and important invention.

The works are situated at Grass Valley, California, 12 miles from the Central Pacific, with which it is connected by a branch road, over which there is considerable traffic, Grass Valley being one of the richest mining sections within the golden State. Gold is the staple metal, and the value of the Fryer process is exemplified by the fact that it does not discriminate the class of ore to be treated, gold and silver ores and silver-lead ores being reduced with equal facility by it. The furnace wherein the ore is subjected to oxidation is circular, and constructed on the wet jacket principle, but showing this difference, that there is not a constant flow of cold water going on between the plates, the same as I have observed in all of the furnaces erected on that principle that have ever come under my notice. In the Fryer furnace the water is allowed to boil and generate steam, which can be utilised in the propulsion of the machinery which works the cylindrical fixtures, wherein is consumated by one operation of eight hours duration the dual process of crushing and amalgamation. The charge for each cylinder is graduated at from 200 to 250 lbs. of ore each eight hours, thus giving a capacity of from 600 to 750 lbs. in the 24 hours to each cylinder, and there can be employed as many cylinders as in the judgment of the superintendent the exigencies of the demands made upon him for increased power of reduction might require. The quicksilver, which is introduced into the cylinder at the same time as is the ore charge, sustains no diminution by loss, for none can escape, and, besides, it cannot suffer the deterioration, "flouring" being effectually prevented by a chemical preparation, which costs but 15 c. per ton of ore amalgamated. The secret, if any there be, lies in the knowledge of the constituents and method of preparing and using this chemical. Whatever precious metals the ore operated on in the furnace contains are brought to the surface in myriads of globules, while there is not enough of the base metals left to interfere with the successful performance of amalgamation. I regret not having yet visited the works, and, in consequence, I now write from what information has been derived from the description given to me by a gentleman associated with the enterprise. J. D. POWER.

San Francisco, April 22.

MINING IN QUEENSLAND.

SIR,—The quantity of tin dispatched from the Warwick Railway Terminus during January and February was as follows:—

	Stream tin.	Ingot tin.
January	Tons 324 0 1 17	..... Nil
February	312 13 1 27	..... Nil
Total	636 13 3 16	..... Nil

The quantity being in excess of the first two months of 1875 by about 12 tons only. The fall of the price of tin in London, as advised last week by wire, to 71*l.* per ton, has not had time yet to affect supply, but it must ultimately do so, and that to a considerable extent. The price of stream tin, 69 to 72 fine, in Stanthorpe, is now 35*l.* per ton, and even less. The price of ingots in London is now less than the stream tin was in Stanthorpe during the first six months of that field's existence. RESIDENT.

Brisbane, March 13.

MINING PROGRESS IN AUSTRALIA.

SIR,—The subjoined items are condensed from the "Sydney Morning Herald" of March 10, received *via* San Francisco:—

NEW SOUTH WALES.—Mining affairs have shown a little more activity during the past month, but operations have been limited to a very considerable extent by the dry weather which continues to prevail, more or less, all over the colony, and which affects both the alluvial workings and the crushing machines. It is expected, however, that when the welcome change of weather occurs there will be a large increase in the quantity of metal sent down. There has been little progress made in mining legislation since last month; and the mining community are getting rather impatient for the introduction of the long-promised Mining Bill, which still remains in the portfolio of the Minister. A museum of minerals has been established in connection with the Mining Department. The collection of specimens has been got together by the officers of the department with the view of diffusing a more general scientific knowledge of the minerals of the colony, and it is opened daily to the public, free of charge. The iron mines, both in the south and west, are getting to work in earnest, and with results likely to tell upon the future of the colony. It is said that iron made from Australian ore is particularly well adapted for the manufacture of steel, and this theory is fully borne out by the experiments that have already been made. There is nothing fresh to record respecting our copper mines in the south and west, or in the tin mines in the north; no new fields have been opened up, but the present workings are being developed steadily, and as rapidly as circumstances will permit.

In the Mining and Metallurgy department of exhibits collected by the Department of Mines for Philadelphia there are about 750 specimens, consisting of 81 different kinds of copper ore, 42 of auriferous quartz, 85 of tin ores, 16 of iron ores, and 35 of various minerals, besides characteristic fossils of the several formations. The Department of Mines has also a large number of samples of gold taken from the gold fields of New South Wales, and assayed at the Royal Mint, Sydney. The description of gold is given, with the locality where obtained, weight of sample, percentage lost in melting, and other interesting particulars regarding the gold industry. The average value of gold per ounce is 3*l.* 19*s.* 9*d.*, but in the colony as high a price as 4*l.* 3*s.* 4*d.* has been obtained. With the gold samples has been sent a gilt model representing the amount of gold produced in the colony—a rectangular block, 11 ft. in height by 6 ft. 6 in. square.

VICTORIA.—Capt. Couchman has been appointed Acting Secretary of Mines. About 500 diggers are at the Berlin rush; about eight claims paying; the general opinion is that the gold-bearing ground is limited.

SOUTH AUSTRALIA.—The Wallaroo Company have declared a dividend of 100*l.* per share. Mr. G. F. Angas has made a gift to the Adelaide University of a scholarship of 200*l.*, tenable for three years, to encourage the training of scientific men, especially engineers, with a view to their settlement in South Australia.

QUEENSLAND.—The value of the metals exported in 1875 was as follows: Copper, 109,963*l.*; gold, 1,498,433*l.*; tin, ore and smelted, 237,879*l.* The obelisk to be erected at the Philadelphia Exhibition, and which is to represent the bulk of the gold exported from Queensland from 1868—the Gympie year—until the present time, will be of pine, gilt, and 20 ft. 2 in. high, by 3 ft. square at the base above the pedestal, tapering to 18 in. square at the top. This will represent 65 tons, or over 6,000,000*l.* worth of gold. Around the obelisk will be arranged cubes, also of pine, gilt, representing the gold exported in each year from 1868 to the present year. A new museum, which is to cost 6000*l.*, is to be erected at the intersection of Queen and William streets, opposite the bridge. The resignation of Mr. Daintree, as Agent-General of the colony in England, is a subject of regret, as both personally and in his representative capacity he has been held in the highest favour and esteem.

NEW ZEALAND.—The quantity of gold exported during the quarter ended Dec. 31, 1875, was 79,619 ozs., and the total quantity exported from the colony from April 1, 1857, to Dec. 31, 1875, from the several ports was as follows: Auckland, 1,000,083 ozs., 3,567,634*l.*; Wellington, 30 ozs., 120*l.*; Pictou, 44,237 ozs, 171,660*l.*; Nelson, Westport, and Greymouth, 1,486,696 ozs., 5,901,557*l.*; Greymouth and Hokitika, 1,958,548 ozs., 7,741,549*l.*; Dunedin and Invercargill, 3,465,701 ozs., 13,600,266*l.*; making an aggregate of 7,955,295 ozs., of the value of 30,984,786*l.* Three nuggets, weighing 160 ozs., have been found at the Lyell. By cable from Wellington, March 9, a discovery of silver ore at Mount Rangitoto, near Hokitika, is reported, one sample giving 735 ozs., and the other 302 ozs. per ton by assay. The excitement is great, and the Land Office is rushed, 6000 acres near the discoverer's claim have been applied for. A. H.

Halifax, N.S., April 27.

THE STANDARD STEEL AND IRON COMPANY (LIMITED).

SIR,—Having frequently heard glowing accounts of the prospects of the above company, I obtained a copy of the prospectus, and found that a patent, bearing the official No. 3840, dated Nov. 7, 1874, and taken out by Messrs. Smyth and Simpson, is the chief pillar of the company's hope, as well as a principal groundwork of faith in those promises upon the strength of which a large capital is solicited.

I accordingly obtained at the Great Seal Patent Office a copy of the specification of this patent, and I regret to say that if this officially-printed document is really a true copy, then, for the following obvious reasons, I consider that patent is legally null and void.

I am not going to discuss the merits of the supposed invention, nor yet to deal with the specification as containing the subject matter for scientific discussion, because it is totally destitute of any trace of scientific knowledge, and shows in many ways only too glaringly the unpleasant fact that the writer is either totally ignorant of the purely chemical question of which he treats, and writes at random statements which are well known to be directly at variance with physical possibility. I do not mean by this remark to question merely the feasibility of certain modes of dealing with iron and steel, but to point out certain assertions about substances ordered as purifiers, which can be as easily proven to be unfounded as would be the statement that lead is lighter than cork, that granite is always softer than butter, and that gold is the most plentiful and cheapest of all metals.

I regret to say that the many unblushing assertions in this specification are quite as easily proven to be fiction as are the above examples; and if I am assailed by the intimidation my only response will be to prove to the fullest extent the truth of what I assert, and leave my assailants to pay my costs and damages for vexatious proceedings, if such should be attempted.

I know nothing whatever about Messrs. Smyth and Simpson, nor yet about the directors of the unhappy company, and I shall deal only with the fact that a document issued under the authority of the Great Seal, and purporting to be a true copy of the final specification of the patent in question, is filled with statements which are an insult not merely to all scientific and practical knowledge, but are also a gross contempt of the Great Seal, if the copy is correct. When I express anything like doubt about the perfectly literal correctness of the official copy I entertain none; but I prefer to take advantage of the privilege of the Patent Law, and to discuss the Crown document regardless of its authorship.

The leading subjects of this specification are four in number:—1. "The Trunnion Ladle."—2. "The Vacuum or Exhaust Furnace."—3. "The Great Force Process."—4. "The Liquid Process."

As regards the trunnion ladle, I have only to say that is is identical in principle with the Bessemer converter, and would be an infringement if that patent were not now extinct. It is, however, more complicated than the converter, and, although it will certainly make Bessemer steel in precisely the same way by a blast of air, it cannot do so at reduced cost. The only difference in applying the blast is that in the converter the blast enters the bottom of the converter, whilst the blast is blown down through a vertical pipe into the molten pig-iron in the trunnion ladle. I have no objection whatever to urge as regards either the trunnion ladle or the vacuum furnace, however, because both are very plainly described in the specification, and both are, therefore, perfectly legitimate subjects both for Letters Patent and for speculation by any company. I may state, however, that the *name* "Vacuum Furnace" is absolutely the only new idea in that part of the process, because it is nothing beyond the reproduction of the old, well-known, and often-exploded method of smelting crushed iron ore and fluxes in the hearth of a puddling or reverberatory furnace, the only peculiarity being the non-essential details, such as the arrangement of a series of such hearths like the steps of stairs—one being worked into the other downwards. Every ironmaster knows that his puddling furnace always has been a vacuum or exhaust furnace in precisely the same terms as are used so distinctively in this specification—by the suction draught of a chimney-flue.

A dim consciousness that this antiquated mode of smelting might prove futile is shown in the specification, because it is said that the process may be carried out by pig-iron otherwise smelted being treated for purification in the trunnion ladle, and, as the latter is manifestly another form of Bessemer converter, it was necessary to couple something else with it in order to make a valid patent. This would be a perfectly legitimate course if only a new feature of utility were superadded; but that feature unfortunately was, in this case, the use of chemical means by which to combine with the blast of the converter or trunnion ladle a drug for the expurgation of the molten pig, although every known substance—solid, liquid, or gaseous—in the whole chemical world has already been claimed by the long-headed Bessemer for this purpose.

The specification is not, however, to be defeated by this unlucky fact, because in the "Great Force," and still more in the "Liquid Process," chemical symbols said therein to be "well known," are freely employed, without one word of translation, as the means of prescribing for the purification of the molten pig in the trunnion ladle by certain substances, miscalled "properties" and "forces," which, so far as chemical knowledge goes, were never before made. The use of these chemical symbols instead of plain English names is no doubt the reason why this specification has so long escaped unmasking, because these awful symbols were, no doubt, High Dutch to the directors. It was, however, the manifest duty of these gentlemen when they saw such an unusual course adopted to refer the specification to some chemist of high standing, as they will now have to do, when they would have found at once that the following is the true translation of these symbols. By this translation, which I have taken, for safety, from the Chemical Handbook of Dr. Miller, F.R.S., it is only too clear that the primary and vital condition of patent right as prescribed by law is completely set aside.

In every instrument of Her Majesty's Letters Patent it is laid down most precisely and emphatically as a condition, without the strict observance of which there shall be no right, that the patentee shall "particularly ascertain and describe" fully and completely the manner in which the invention shall be carried into effect, and it is irrevocably laid down both in the Act of 1862 and in many judicial decisions that "if anything is ordered or required to be done by the patentee the method of effecting which is not described fully by him, and is otherwise unknown, then his patent is wholly null and void." His description must, moreover, be such that any person of ordinary skill in the art or manufacture concerned shall be able to work without difficulty or doubt therefrom. The word "Patent" means laid bare to the world, made known, and the law declares that any secrecy by the patentee annuls his title.

Judging upon this long-established principle of Patent Law, and from the following absurd and impossible instructions in that specification, which are clearly either barefaced humbug or illegal concealments of essential details, the patent to which the specification in question belongs is totally invalid, and any money raised on the faith of such a property is raised on delusion. There is no alternative. It is either one or the other, and in either case void.

At page 22 of the specification will be found the description of an apparatus by which the miraculous and wholly unearthly work of the new purification of molten iron is to be effected, and the chief points of note are "the high-pressure accumulating receivers for holding the great forces." With the true spirit of ignorant and audacious charlatanism which pervades this specification these receivers are ordered to be of the exact cabalistic number "seven," and their contents are shrouded in mystery, by being described only in chemical symbols, the translation of which, on the authority of the standard work of Dr. Miller, F.R.S., is as follows. These receivers are marked by the first seven letters of the alphabet.

Modesty in some degree was respected in selecting the chemical symbols which were to do pretentious duty in receiver A, because it is to contain either carbonic oxide or atmospheric air, which is here

and everywhere else in this curious specification put down, with characteristic ignorance, as synonymous with oxygen.

Receiver B is to contain carbonic anhydride, the use of which I believe never entered Bessemer's head as a purifier of molten iron, because it is known to be a fatal enemy. It is also to contain, as an alternative charge, that most costly and corrosive substance hydrofluoric acid.

Receiver C is to contain ethylene. An alternative charge is, however, provided, and in this provision lies the first glaring instance of that which is amply sufficient to invalidate the patent, by being either a delusion or a fatal concealment of an unknown chemical fact. This alternative charge is to consist of a mixture of ethylene with a fictitious compound of carbon and the rare metal lithium, which compound is wholly unknown. It is to consist of one atom of carbon, with two atoms of lithium. This one point shows that character which, as either a delusion or as a concealment of an otherwise unknown chemical fact, is fatal to the whole patent; but far worse has yet to follow.

Receiver D is to contain either napthaline or anthracene, and the fact that the latter commands such a high price for the production of artificial alizarine—too high to make it possible as a purifier of pig-iron—goes for nothing. It is also everywhere provided in the specification that these solid substances, which will neither volatilise nor remain gaseous except at a very high temperature, shall be transmitted through cold pipes as permanent gases. This is utterly impossible according to all present chemical knowledge; and, if there is a way to do it, the total concealment of that needful instruction is again wholly fatal to the patent right.

Receiver E is honoured with a perfectly feasible and reasonable charge of hydrogen, which is one of Bessemer's old friends again lugged forward as a new idea.

Receiver F is to contain nitrogen gas only; and here again there is either a delusion or a fatal concealment of a necessary detail, because, although that gas forms the greater part of our atmosphere, it is by no means cheaply separated from the oxygen on a large scale in perfect purity, and, still worse, is universally regarded by all chemists as destitute of all affinity for, or effect upon, either molten iron or its impurities. The specification conceals how to render nitrogen a purifying "force," and thus again breaks the Patent Law.

At pages 26 and 27 of this specification the imagination is revived by the revelation of the "Liquid Process," in which either reckless delusion is supreme, or else there is a total concealment of marvellous knowledge unknown to all the world, which concealment still more emphatically nullifies this pretentious patent. The "Generator" under this "Liquid Process" is a true witches' cauldron, because the instructions contained in the specification are of no use unless supplemented by the aid of that Being in whom Mr. Cook believes and Mr. Jenkins does not. It is to be lined with Roman cement, and this lining is to be "coated with asphalte, which is covered with pitch." Seeing that this generator is to contain napthaline and anthracine in the gaseous form, and, therefore, at very nearly red heat, it is clear that the asphalte and pitch lining will soon be reduced to a rare witches' broth for the benefit of the faithful.

The top of the generator is to be divided into seven compartments, that magical number being evidently essential to success, and these compartments are also designated by the first seven letters of the English alphabet. Tubes are provided by which the gasified contents of these compartments are to be passed into the generator; but, although I have examined the well-executed drawing with the greatest care, I am unable to discover so much as a pin-hole of aperture through which the seven magical compartments can be either charged or replenished. This may be a mere "beauty spot" to those who got up the company's prospectus; but in the eye of the law it is, like many other unpardonable defects, fatal to the patent.

Compartment A is to contain napthaline, and compartment B is to hold anthracine, both of which are to be gaseous at the temperature of "dry steam." Every chemist will declare this impossible; but, as it was manifestly quite possible to the inspired dreamer of the invention, the concealment of the secret how to do the wonder again suffices to make the patent null and void.

Compartment C is to contain hydrochloric acid, or napthaline, or anthracine, or hydride of ethyl, but how this latter costly chemical is to be had is left entirely in the dark.

Compartment D is to contain a substance wholly unknown hitherto upon this benighted earth—an iodide of carbon; and, as the secret of making this otherwise impossible compound is not revealed, there is here another item in the long list of violations of that clear law of specification without obedience to which no patent can have any validity whatever.

Compartment E is to contain a solution of nitrate of soda and quicklime, and compartment F is to contain a mixed solution of caustic potash, caustic soda, and quicklime; whilst the last compartment, G, is to be honoured by the intensely corrosive and costly hydrofluoric acid.

This elaborate statement of what the several compartments are to contain is followed, without break, by the astounding assertion that "these compounds are generated into gases in their compartments, and also in the generator." No man has ever yet succeeded in turning into gas either caustic soda or caustic potash; but the conversion into gas of quicklime, which resists the oxyhydrogen flame, and, therefore, the most intense heat known, is an unexplained wonder and unrevealed mystery, which by itself is more than sufficient to stamp the patent as invalid, if the printed official specification is correct.

In the foregoing analysis I have dealt solely with a document published by the Crown, and I decline to vouch for its correctness as a copy, or to make any comment on the good faith or otherwise of its authors.

W. A. LYTTLE, C.E., F.C.S.

The Grove, Hammersmith, London, W.

CREDIT FONCIER OF ENGLAND.

SIR,—It appears to me that it is impossible that this company can pay any dividends to the shareholders so long as such unnecessary and exorbitant remuneration is given to the Chairman and directors, and while this very heavy charge is nearly doubled by salaries to sub-managers, to relieve the former from the trouble incident to their offices. It is, therefore, high time for the shareholders to insist on some suitable reductions in these very extravagant expenses.

Referring to the profit and loss accounts of the two preceding half-years, I find the expenses for the year ending Dec. 31, 1875, present the following appalling figures:—

Directors' remuneration	£3000	0	0	
Salaries also for the year	5536	6	3	
Auditors' fees	250	0	0	
Rent for the year	1805	0	0	= £10,591 6 3

Now, while the directors are not able to give even 2½ per cent. on the original shares of the company, there is no reason that the shareholders should not reduce the remuneration to the directors and their assistants, which, indeed, in many companies under such circumstances the Chairman and directors have themselves with laudable self-denial proposed. Were the two first items reduced one-half, the Chairman, directors, and their working assistants would have 4268*l.*, which ought to be considered ample remuneration. The rent, too, at 1805*l.* is enormous; offices at 900*l.* might suffice.

A SHAREHOLDER.

WATER SUPPLY OF LONDON.

SIR,—In the discussion upon Mr. Easton's paper, read at the meeting of the Institution of Mechanical Engineers, reported in the Journal of May 6, Mr. Spon refers to two wells on Stockwell Green—one yielding 30 gallons of water from 100 ft. in depth of chalk, and the other 46 gallons per minute from 150 ft. depth of chalk, in which the proportion is also as nearly as possible 30 gallons per 100 ft. depth of chalk. Then Mr. Easton states that the rise in the Brighton well is about four months behind the rainfall. Now, what I should like to know is whether these data might be used to calculate how to get the maximum quantity of water for the London supply—that is to say, how near to each other and in what position the wells should be put down.

While writing will you permit me to ask the probable cost of putting down artesian wells of (say) 200, 300, and 500 ft. respectively. I understand the cost increases with each 100 ft., but should like to know the rate and amount of the increase.

LIQUID.

May 16.

BLAKELY HALL (BIRMINGHAM) COLLIERY.

SIR,—I shall esteem it a favour if you will bring the following particulars before your readers, as some of them might be able to answer if it is correct, and what kind of action is open to the debenture holders. I took them, being assured it was a *bona fide* concern, and a respectable directory.

The colliery was valued at 250,000*l.* Debentures issued, 100,000*l.*, changed into preference shares, 70,000*l.*; and I am told the mine was sold for 17,200*l.*, and then a company was to be started with a capital of 30,000*l.*, with Alderman Carter, M.P., and others as directors. I complain that I am deprived of 125*l.*, being five debentures of 25*l.* each. I can get no information, having written to Alderman Carter, and he does not reply.

TENAX EXON.

MINING AND UNDERMINING.

SIR,—Your correspondent T. Vosper's letter on the above text is about the most sensible I have read for many a long day; he hits not one but many nails right on the head. If shareholders would but compare the costs of management with the costs of labour, they would see why there are no dividends. Mr. Vosper, however, must know that the costs of management are legitimate plunder, and that in a general way the more ignorant the management the greater the plunder, and that a skilful and honest agent who tried to carry out the system recommended by Mr. Vosper would in 19 cases out of 20 be deposed by the managers. The agent or captain who can by his pay-sheet show a hard and fast line of wages all round for the year is at once considered a first-rate miner, whereas the minimum of practical experience would at once show that such a result can only be obtained by a system of "cooking," fatal to the interests both of masters and men. A bargain from which a surplus of gains can be deducted, and a loss of wage made up by gift or loan, is no bargain at all, and leads to nothing but idleness or dishonesty among the men, and loss both of time and money to the masters.

There is but one way of treating an honest and good miner, and that is to let him have his hands free. Monthly bargains tie both his hands, and at every month's end his aim is to get his forehead into as bad a position for letting as possible, whereas if he has a bargain for a given number of fathoms, or a given number of bings or tons of ore, he will bray away at it to the utmost of his power, knowing that the more ground he cuts the better for him, and that if during the month the ground gets easier he will earn more next time, and that the captain cannot come in and cut down the price on account of his having earned 30s. a week. The same with ore bargains; the poor fellows will almost kill themselves by working day and night if they have got a good bargain of 50 or 100 bings, in order to get it out as soon as possible, but if they know their masters have a hard and fast line, and that they will not be allowed to earn more than 18s. or 20s. a week, their sole object is not to exceed the amount of ore that will ensure that sum. The agent knowing well that he will be hauled over the coals if any of his men exceed the average, is thus forced against his better knowledge to act diametrically contrary to his convictions, in order to please his masters, who usually know about as much of mining as the man in the moon, but get handsomely paid for wasting the money of the shareholders.

To a practical miner a uniform rate of wages in a pay-sheet would beget nothing but suspicion. The best agent, captain, or miner out can see no further through a brick wall than anyone else. The richest forehead may turn poor in 2 fms.; the poorest may become rich in the same distance. A change for the better may take place in the hardest cross-cut forehead in a week after it is let, or for the worse; the only thing an agent can do is to judge the price as it stands. How, then, is it possible for all the men to earn the same amount of wages? I have known agents frightened out of their lives at showing a pay-sheet to their masters, because a few partnerships of men had earned more than what they chose to consider fair wages—that is not the way to get work out of the men, or money into the masters' pockets.—*May* 11.

GEO. WM. DENYS.

GOLD MINING—THE CLOGAU MINE.

SIR,—As the Clogau Gold Mine appears likely to again occupy some space in the Journal allow me to state what was done in the time of the old company in the way of reducing the poor ores.

The rich ores were all wrought down in Britten machines, and according to my experience of those machines none better could be employed for the purpose. A prejudice formerly existed against large Brittens. I have now at work six, the basins of which are nearly 4 ft. in diameter, with a wooden tub 12 in. deep round the top. They treat 20 tons of very hard quartz per month, and upon the average extract 95 per cent. of the assay contents of the ore in fine gold, with a loss of from ⅓rd to ⅔rds of an ounce of mercury per ton of mineral treated. The Clogau gold ores are not much encumbered with sulphurets, and the sulphurets enclose very little gold; in fact, the Clogau ores are very easy to treat: 300 tons of tailing sand yielded 1 ton of copper ore of 10 per cent. assay for copper, containing about ½ oz. of gold per ton. Formerly the ores were carefully hand-picked when brought out of the mine, and every particle of visible gold was picked out. This left the great bulk of the ore broken exceedingly poor, so that out of every 20 dwts. of gold extracted 18½ dwts. were from hand-picked ore, and 1½ dwt. from stamps ore. Previous to the erection of stamps many thousand tons of poor ore had in this manner accumulated on the mine.

The stamps were driven by water and steam combined; when the water fell short a steam-engine was put on; they drove between them two barrel axles coupled together, of 16 heads each, four heads in a cast or wrought iron coffer, the speed from 60 to 72 blows per minute per head, and the grate 120 holes per square inch. At first they would not get through more than 1 ton of stuff per head per 24 hours, but by various alterations they were brought to do 45 cwts. in the same time, and through the same sized grate, but more water way was given to the grate. Sometimes, when the gold was coarse, as much as 60 per cent. of the gold extracted would be found in the coffer—at other times scarcely any; the sand after passing the grates flowed across a broad "head launder," where also a good deal of the gold was deposited, and then passed on to the blanket strakes, which were of large area, and upon them also there was a considerable deposit of "blanket sand," assaying about 16 ozs. gold per ton. The sand and water escaping from the blankets flowed into a "tailing launder," which conveyed them to another building, where they passed through a Rittinger's No. 1 classifier; the sand, &c., which was deposited discharged through an iron pipe on to a double Rittinger's side-blow percussion table driven by a small water-wheel; the copper ore was separated from the sand, and discharged from the table in a marketable state; at times 30 tons of ore were passed over the table per 24 hours with the labour of two boys. After passing through classifier No. 1 the slimes would pass through another classifier—No. 2—and on to a second percussion table, but the slimes were found to be so poor that the second classifier and table were given up. The coffer work and head launder sand was ground and amalgamated in a Britten machine, and the blanket sand was amalgamated in a Mosheimer pan, which, although of late somewhat blown upon in Wales, is nevertheless an excellent amalgamating machine for those who know how to use it.

From the mine to the reduction works is nearly a mile, and the fall about 900 ft. The ore was brought down a railway to the head of a double inclined plane of 550 yards long, worked by a line-rope, the full wagon pulling up the empty one. A short piece of level rail at the bottom of the incline brought the full wagon to a tip, when it was discharged into the large pass of a Blake's stone-breaker. Cost of tramming, including horse hire to take the empty wagons back, by contract, 8½d. per ton. Cost of stone-breaker and tramming to stamps passes 3½d. per ton. Cost of all other labour, for watching the stamps, attending blanket strakes, amalgamating blanket sand and coffer work, attending to percussion tables, &c., and miscellaneous labour, 2s. 3d. per ton. This charge was less when the work of the stamps was increased to 45 cwts. each per 24 hours. From Oct. 1, 1866, to Nov. 30, 1867, a quantity of 3362 tons of poor ores, after hand picking, was brought down and stamped, and the following statement will show the cost and returns:—

Returns from 3362 tons of poor ores—		
Gold 292 ozs. 17 dwts. 22 grs. at 75s. per oz.	£1098	
10 tons copper ore from tailings	60	= £1158
Cost from mine to dressing of tailings—		
Labour, including tramming and all reduction charges	£ 557	
Coals for stonebreaker engine	61	
Repairs, after deducting old materials	40	
Balance of profit	500	= £1158
Average yield of gold 1 dwt. 17 8-10 grs. per ton.		

The yield of gold was estimated at 76 per cent. of the gold contained in the ore by assay. It was not the poverty of the mine that made the old company give up, but it was the exorbitant conditions demanded by the lessors, beyond which the lessees could not see a probable return for their outlay; there were men in that company who would have "adventured their shirts" if they could have done so upon fair conditions.

I have been frequently questioned as to why the Hungarian stamps were given up. To this I reply—upon commercial principles. At one time there were 16 Hungarian stamps, and 16 what I will call Cornish stamps, the two stamps axles were connected together, and driven by the same water-wheel, the heads, therefore, moved simultaneously under the same conditions of speed, height of lift, &c.; 300 tons of ore were fed to them by alternate wagons, so that the produce of gold in the ore supplied to each was as nearly as possible the same. The yield of gold when the experiment was completed was just the same, but when the Hungarian system had got through 1 ton of stuff the Cornish stamps had stamped 38 cwt. The balance of speed being in favour of the Cornish stamps the Hungarian were given up, but the percussion tables which formed a part of the Hungarian system were retained.—*May* 16.

ARTHUR DEAN.

GOLD MINING—THE CLOGAU COMPANY.

SIR,—I observe in the Supplement to last week's Journal, under the above heading, a letter from the secretary of the Clogau Company, written at the instance of its directors, and I gather therefrom that the directors are veering round to the opinion I expressed to a shareholder and director some months ago, after viewing the machinery then recently erected at the reduction works. If so, it is something gained to have learned that in "feeling their way to the best methods to be adopted" they are on the wrong path now. So far we agree very well, and if the letter had ended here this would not have been written, but the letter continues—"By the desire of one of the shareholders Mr. Harvey himself was applied to some months ago, as it was presumed in his advertisement in the Journal that he was prepared to give advice. He stated he would gladly give them any information he possessed, but he would never state what fee he would require for doing so, therefore the directors have so far been unable to prove whether Mr. Harvey's information could be of service to them."

Now, I am always glad to do business, and I was surprised to learn that I refused to state what fee I should require for my services in aid of this very mine whose operations, as now being conducted, I so unequivocally condemned. I refused with a difference. I refused to try and patch up machinery almost altogether unadaptable for the purposes intended, and as unhappily located as it was designed, but it is inaccurate to say or infer that I refused to give the company advice, for I advised both the shareholder and the director to pull down the whole of the machinery at once, and that without any fee. So the facts are somewhat inverted. They imparted partly directly, and partly inferrentially, that I refused to name a fee and gave no advice, whereas I gave advice and charged no fee. The result of temporising with such machinery would have been a reflection upon me as a mining engineer, and a useless expenditure of money, the stamps alone being capable of modification, although at considerable expense.

The concluding paragraph of the secretary's letter conveys a false inference, and suggests an unworthy motive. It may, therefore, be advisable for me to state that I never furnished the company with any designs of any description, either for the stamps or any other part of the machinery (and that for the reason above stated), therefore I cannot be accused of finding fault because my ideas were not carried out with regard to machinery which was erected before I knew any of the persons connected with the mine. Facts are stronger than opinion, and will refute or confirm my prognostications so strongly enforced on the director's and the shareholder's attention immediately after my return from the mine. I never contemplated a chirographic tilt with the company when I wrote my first letter on this subject, but I am fully aware that a little ventilation of mining matters in the public journals is frequently productive of good by provoking discussion, and thereby eliciting information.—*Moorgate-street, May* 18.

C. J. HARVEY.

COPPER DEPOSITS AT NANTLLE VALE, CARNARVONSHIRE.

SIR,—On the entrance of the pass from Nantlle, at the Symdde Dylluan Mines, the mineral vein of which I have spoken is cut off in the same manner as at the eastern end of the pass, at the Drws-y-Coed Mines, but it is not so easily seen what has been the cause. There can be no doubt, however, that the effect has been produced by the same cause—the intersection of the same kind of slides. Going about 200 fms. further west the same lode is seen to rise again above the surface of the valley for a height of 400 ft., forming a similar surface to that at the eastern end of the pass. At this point the same kind of slides are observable, which speaks in language that cannot be mistaken that it was those that rendered material assistance in shaping the external structure of the outcrop of the lode as well as the general contour of the land.

At Symdde Dylluan Mines these slides are very observable, and where seen to crop up to the top of the mountain a hollowing out of the rock has taken place. Facts which I shall hereafter lay before you will show that the miner cannot pay too much attention to these, although, perhaps, it may seem superfluous to have dwelt so long on them. What has been the cause of them I will not stay to speculate, whether by electric currents, or any other force or forces. It is evident at some remote period in the history of our planet this place has been subjected to tremendous convulsions, of which, perhaps, Etna or Vesuvius is only a faint type. Evidence of this is seen on the tops of the mountains, which are covered with feldspathic trap rock and ash, and not only there, but we see the strata at their roots dislocated, contorted, and thrown at nearly every angle within a very short distance, and the whole of the formation has been removed from its first resting place. With these exceptions the strata run nearly parallel with the lode, and dip at about the same angle. These contortions do not at all affect the bearing of the lodes, and in many places large deposits of ore have been found in the latter in conjunction with the former, the cause of which induction from the known fact may teach us. I think that we are safe to surmise that the lodes have been formed since those changes have taken place in the surrounding rock, for certainly such disturbing force would have left its marks on the one as well as on the other, and such being the case, the lode might, for reasons which I shall presently show, be more productive here than elsewhere. Had the lode been a stratified layer of silicious matter, and tilted on its edge with and at the same time as the adjacent rock, it is not at all likely that it would cut through the strata of the clayslate formation; for example, at the great mountain, which stands on the opposite side of the pass, the lode runs parallel to these, but dips in an opposite direction to the strata, showing clearly that the lode is of a later origin than the formation in which it is situated.

The vertical slides of which I have spoken run through the whole, affected by neither any further than being pinched up very small where the rock is hardest. This fact teaches us that these must have been the last that were formed. Although the lodes have produced no effect on them, yet they have had a very material influence on the lodes, at places cutting them off and throwing them for a considerable distance; and it is by close observation only that a person can say with any amount of certainty where they are to be found again. But, in addition to this, they have had for some reason, which induction alone can explain, a most salutary effect on the lodes, making them at the point of junction extremely rich in

copper ore. This same phenomena is observable in the old mines at Beddgelert, the Llanberis, Great Snowdon, and Clogwyn Coch Mines; and at the Cwm Dwyfor Mines, where, as yet, comparatively little has been done any more than the discovery of the same indications of a productive mine as may be seen at the same depth both at Symdde Dylluan and Dws-y-Coed Mines. They have discovered, as in other places in the vicinity of the Snowdon range, that the lode is most productive where intersected with the slides. For the present I will not trespass any further on your space, but will continue the theme next week.—*Pen y-Groes, May* 17. JOHN ROBERTS.

MINING COMMITTEES AND DIRECTORS.

SIR,—There are many persons who doubt the utility of committees and directors of mines, because very often, in ignorance of mining matters, they direct things to be done in opposition to the knowledge and wish of the so-called manager. Of what good, for instance, is the Dolcoath committee? Perfectly useless, except they have the pleasure of dining at the account-house about once a month, so putting the shareholders to useless expense. About three years ago several mines were set to work between St. Austell and Roche—North Bonny, Great Beam, Cornubia, &c.—under a board of directors who put the company to an enormous expense in their frequent travelling from and to Manchester, living at expensive hotels, and riding about the country on pleasure. All these mines are now idle, after an expenditure of nearly 100,000*l*. I am so informed by a gentleman who is now here from the West.

New Consols, in this neighbourhood, is governed by directors, but they are of no service except in the provision of capital to carry out the needful works. One of them—I do not know his name exactly—comes down frequently from London, and stops at the mine a week or two at a time. I asked a man who works at the mine what he came down for so often? He replied, "I suppose he wanted a little pocket money." It may be that there is some truth in the statement, but the man said that his director did not interfere with Capt. Pryor's management, that he could learn. But his frequent visits, useless as they are except to himself, cost the company a great deal of money. HEARER.

Calstock Town, May 11.

MINING IN CARDIGANSHIRE.

SIR,—In looking over the Journal of May 6 I find a letter written by "Hard Times" upon the general mines and mining districts of this county. "Hard Times" wishes the world to know that Cardiganshire Mines are all too old and worthless to induce parties to go into again, but that they might go into new setts and at once form companies of local gentlemen, amongst others, who might come forth from all parts. Now, I would like to know from "Hard Times" where a new sett or a new mine in this county has done anything worth talking about for the last 30 years? Indeed, you cannot find a mine scarcely in the county but what has been worked by others, some hundreds and some thousands of years ago, are still working, and are the mines spoken of by "Hard Times" as the best in the county. This no mining man can deny. And again, there is not a mine in the whole county more than about 150 fms. deep, and the deepest are at the present time the richest, so what can we look forward to? It would be useless to take up ground for mining purposes, go on as people generally do, spending money upon foolish things instead of putting it in trying the value of underground to a good depth of (say) not less than from 40 fms. to 80 fms. or 100 fms. "Hard Times" speaks of Bronfloyd Mine, of its lode, and of its run; he classes this mine with the Darrens, &c., but there is as much difference between the two lodes (for it is not the same lode), nearly a mile apart, as there may be found in all different class ores; and I think that "Hard Times" would go a long day's journey upon the Bronfloyd lode to the east of Llawr-cwm-bach, and other mines in that district scarcely worth mentioning, before he could find a sett worthy to induce a local party of gentlemen who would pay for the turning of the first sod, as I do not think that such a thing as a local company could be got up to work a mine, if it were certain to prove, and turn out, gold enough to purchase the moon. They will take whatever you like to give, but touch their pockets upon outgiving in mining, and you may soon learn to go elsewhere, or never succeed. There is a party, or in fact two or three, who, when they find a mine knacked, go and buy the lease, machinery, &c., and keep them if so wanted, or have auctions, and so dispose of them; yet they take care not to buy the plant without the lease, and when times are supposed to be again moving for the better they will try to dispose of the mine, afterwards dispose of the machinery to the party, of course, who wants it. Although many of us may look upon this way of trading as not exactly right—shopkeepers, storedealers, and any other dealers of ware, &c., carrying on such business, but it is nothing to us, let everyone live and do their best.

If any gentlemen, wherever they may live, are at any time inclined to go into good legitimate mining, let them enquire of a sound practical mining engineer where to spend their money, and they will have no occasion to grumble, in the long run, of their mining speculations; and this, doubtless, is what "Hard Times" would make us all understand. If so, I thank him for speaking out, but at all times let the real name, and not the ridiculous appear.

Whilst I am writing, I would at once mention having seen a letter in last week's Journal from Mr. Absalom Francis, who appears willing to endorse all that "Hard Times" had written, and then himself goes in with a determination to carry on an opinion of the same ground, but directly goes over the hills about 6 miles to the south, and begins the Great West Van on the great amount of capital expended in erecting machinery (years ago) and in developing the mine, and that it is not improbable that 12 months hence it may become a small dividend mine. I hope the poor shareholders will not be thoroughly disheartened, seeing that 12 months is the period laid down for them to make such preparations as to seek some place of safety to deposit their dividends. Now, I cannot make out why he goes over to these mines when commencing to show the run of Bronfloyd and other mines in the neighbourhood, or the run of their lodes into Montgomeryshire. Why break off from the subject, and bring on paper mines entirely in another district?

Mr. Absalom Francis goes on next to mention the West Esgair Lle Mine, of its containing too much sulphur for lasting courses of lead to live in. Now, we all know that the stronger the course of sulphur the greater the bulk of lead when reached, as has been proved in mines on the same lode; but in running on further we see the object in view—the Temple Mine. This little new concern is on the same lode as the mine he speaks of as having too much sulphur for lead to live in. I cannot see why one should be so unfortunate as to contain so much sulphur, and that none should be found in the other, but a lode of lead ore worth 1 ton per fathom under grass, and that it is no other than the great Ystumtuen lode, which, of course, runs through the Bwlch Gwyn and Penrhiw, now known as the Aberystwith Mines; here in the last-named mine they had a lode of sulphur in the 36 end driving west of at least a foot solid, and by their pushing forward they came upon lead instead of the sulphur, although not entirely lost sight of, neither will it ever be, perhaps, in such a county, especially in this lode, impregnated as it is with such strong and hardy a mineral. Now, the Temple Mine lies between the Aberystwith and West Esgair Lle Mines, so that we must expect sulphur more or less in this property, but as so little has been done as yet in this mine, no one can give an idea what it may lead or come to. I hope they may have a good mine, and I cannot see why they should not, seeing that the ground for the whole length of the sett is one unbroken piece of beautiful clean grassy mountain, and joins the Aberystwith Mines to the eastern boundary near to one of the ponds belonging to the Aberystwith Mining Company. I hope, therefore, since people can sit down and write as much and as long as they like, and that the paper is at all times ready to welcome their reports, that they will commence and go through with their sermon, and stick to their text, not but what they can if they like.

There is another letter in the Supplement of last week's Journal, signed John Roberts, of the Symdde Dylluan Mine, or in English the Owl o' Chimney Mine; he has commenced giving us his opinion upon the formation of the ages of strata, lodes, slides, deposition of copper, and physical character or configuration of the surface, and to acquaint us with the agent of Nature, and will, perhaps, be able to tell us where the copper came from to fill up the great vacancies, and how and at what time the vacancies were made to receive the enormous quantity of copper so as to fill the coffers of the once fortunate proprietors. We will look out and try and learn that which all mining men have longed to know, but hitherto have gone to sleep without giving us an idea of any other but the first creation of the world. Any other formation we are hard to believe in since the questions put so often to all as above, How, where, and when,

Aberystwith, May 16. SAMPSON TREVETHAN, C.M.E.

CARDIGANSHIRE MINES.

SIR,—Since my last letter to you a lode has been discovered at surface at a place called Llechweddmaur, just on the borders of the above county, but in Montgomeryshire. I have seen it, and it appears to be of great width (they are not yet across it) and strength; there is no doubt but that this is the same lode which has been worked in Bronfloyd, and to which I referred in my last communication. I trust this may lead to a rich mine, and so encourage a further trial of this same lode in the long run of ground further west, when I have no doubt the results will be satisfactory, and mining in this great lead-producing county cease to have— HARD TIMES.

Aberystwith, May 15.

CARDIGANSHIRE MINES (NEW AND OLD)—No. IV.

SIR,—Referring to the district between Bronfloyd and the eastern boundary of this county (Cardigan)—after we pass Old Darren, Cwm Darren, and the East Darren Mines—we have nothing done on the line of these veins but a few surface trenches dug here and there for a distance of pretty nearly six miles, when we come to the River Rheidol, at the foot of Plynlimmon, and after passing it about one-half mile in the direction of the lodes nearly east and west, we arrive at the Nant-y-Moch Mine, where we find the vein at surface composed of one of the richest gossans seen in the county, and very similar in character and composition to the rich Frongoch and Graigoch veins of the Lisburne Mines, and the size of the lode also is just the same, varying in width from 20 to 60 feet, and which is the width of the Van lode also. I would here state that the Darrens have yielded millions of pounds worth of silver-lead ores, and are still continuing rich; where found most productive, as is the case in the Old Darren westward, and East Darren, the vein is found to be from 20 to 60 ft. wide also. At Nant-y-Moch a 22-ft. water-wheel, 3 ft. 6 in. in breast, has been erected, with line of rods, pumping gear, drawing machinery, &c., and every other requisite for a preliminary trial; the engine-shaft has been carried down 10 ft. long by 6 ft. wide within the timber, for it has been timbered all the way from surface to the 30, to which depth the shaft was sunk at one draft, and at the bottom the vein was cross-cut, proving in this place to be as much as 60 ft. wide, containing veins of quartz, carbonate of lime, and spotted with lead and copper ores. The end has been extended about 6 fms. east of the engine-shaft, on the north part of the lode, where the vein is of much the same character as in cross-cutting, letting out a good stream of water, and is altogether what may be termed a vein of great promise. The 30 has been extended west for a distance of about 10 fms., and at this point approaches the place where in the adit level above for 20 fms. a most beautiful gossan, blende, and fine lead ore have been driven over, so that at the 30 it was thought desirable to turn the direction of the lode south-west for the purpose of going obliquely through the vein. This has been extended about 5 fms., and has passed all the way through fine veins of quartz and carbonate of lime, the whole of the lode showing fine rich silver-lead ore throughout. I believe that when the south wall has been reached, 5 fms. more, that a very rich course of ore will be found, and one of the most productive of the Cardiganshire mines be laid open. There is the finest cross lode that I have ever seen in the county, that forms a junction with the main lode a little to the west of the present forebreast; this cross lode has been seen at surface, and is about 6 ft. wide, composed of flookan, gossan, and fine lead ore; it is the influence of this vein, with the flookan, that has caused the ground in the engine-shaft to swell, and consequently to be timbered closely from top to bottom. A quantity of gas has been and still continues to issue from the 30 south-west, driving through the vein, which is the only instance of such a case that I have been acquainted with in this district, with the exception of the Van lode, at the Van and other points opened on.

I will next week give you a description of the Berthllwyd grant, which is on the line of the Logylas and Glogfach veins of the rich Lisburne Mines, and distant from them about three miles, there being but little done between these points, with the exception of an adit level driven into the east of Berthllwyd, and to the east of the brook that forms the boundary between the Bron Caradoc and Berthllwyd Mines, the adit being driven in the Bron Caradoc sett. In the driving of this adit rich courses of copper and lead were found, some of which have been taken away at 5*s.* in 1*l.* tribute. I offered some time since 4000*l.* for this grant, but the party who were promised a lease of the property could not then obtain it, and the matter fell through—3000*l.* is ample to provide any further necessary machinery, and for fully and effectually trying the Nant-y-Moch Mine, and 1000*l.* for proving the Berthllwyd to be a good mine or otherwise. Both of these can now be obtained not only on moderate but exceedingly liberal terms; and when we see that in Esgair-hir and Cwm Brwyno old mines more than 150,000*l.* has been lost in one continual stream, one may well feel astonished at being informed that a person, and that person the late Matthew Francis, my brother, writing nearly 30 years ago, said that if 150,000*l.* were expended in developing new properties in Cardiganshire, that sum could be made to pay 150,000*l.*, or cent. per cent., per annum; and I firmly believe at this present moment that if that amount were judiciously expended the fact would undoubtedly be more than verified to the letter.

It is gratifying to find some of the Cardiganshire mines assuming brighter prospects, amongst which are Powell United, De Broke, and some others, of which more anon. ABSALOM FRANCIS.

Goginan, May 16.

LEAD MINES OF DERBYSHIRE—No. VIII.

SIR,—Since our reference to the Ecton Copper Mine we have met with a short account of it in Mawe's "Mineralogy of Derbyshire." Mr. Mawe visited the mine in 1802, and describes it as having been enormously rich in copper, but as then in a declining state. He gives a drawing of the interior, from which it appears that the ore made in large cavities or chambers, one beneath the other, but all connected. In some places the ore, which was a rich sulphuret, had a breadth of 70 yards—in other places 30 or 40 yards. The metal produced was highly esteemed for ductility and other good qualities, and was in great request for making copper boilers and sheathing for ships. The depth of the Ecton Mine, in 1802, was 140 fms. below the adit, which was 100 fms. below the surface. It is now full of water, and reputed to be nearly 300 fms. deep. If our information is correct, the bottom of the mine is an immense mass of sulphur mundic. If this is the case it is highly probable that a deposit of lead or copper underlies the mundic. The scenery near Ecton is extremely fine, but little visited. It can be approached by taking the rail to Ashbourne, from which it is about 12 miles north, or from the Rousley Station of the Midland, and an equally beautiful drive of 13 or 14 miles through Youlgreave and Hartington. As to the difficult question of re-working any of the mines in this county, we should think that little success is probable in the extreme south—we mean the two isolated districts of Crich and Ashover. Rich as these have been, and at no very remote period, they seem to have been thoroughly explored, the levels having been driven in several cases far beneath the grit. We should rather advise the adventurer to turn his attention to the vicinity of Matlock, Bonsall, Winster, Middleton, Monyash, and Ashford. Of the extreme north, the neighbourhood of Buxton and Castleton, we know very little; the mines near Castleton, however, have been extensively worked during the last century by Sheffield adventurers, and generally with bad success.

In conclusion, we regret to observe how very rarely Derbyshire mining is mentioned in the columns of the Journal. We know that there are many in the county, both mineowners and mine agents, who are able to give a good account of Derbyshire mines at the present time, and we feel sure that the columns of the Journal will be readily open to them. What is wanted, and wanted from practical men, is an account of what the mines are doing at the present time, what facilities there are for opening new works, where it would be best for companies to commence operations, and so on. We trust very soon to see communications in the Journal from more practical men than ourselves on all the above most interesting points.

J. B.

UNWROUGHT MINERAL GROUND.

SIR,—As a rule, the mineral which produces the gossan on the backs of lodes is generally found in small quantities ere it reaches the great deposit below, and wherever this occurs you may be certain of its leading to a profitably productive course of mineral. It is in this way that our rich mines have been discovered, and it is in this way that rich mines are now to be found. In surveying the unexplored mining ground of the county traces of small workings, made, no doubt, by needy workers probably centuries ago, are here and there to be seen, in many cases on lodes which on being developed will turn out large quantities of mineral. A large tract of unwrought ground lies to the south of and parallel to the Clifford, United, and Great Consols Mines, in Gwennap, and on a line with the lodes which proved so rich in the Treseavean district. In this section of ground may be seen the great mineral hot-beds—elvans which compare favourably with those near the rich bunches of copper in the Great Consols and other mines parallel to it; there are also the much desired cross-courses intersecting the copper lodes, about the same oblique angle as in the productive mines adjoining. Here, then, is a field for the investor, having lodes of copper running east and west, from which may be seen cropping up to the very surface large broils of gossan, mixed with copper ore. It is of rare occurrence on proof for such instances to fail leading to rich deposits of mineral. The expense of working such shallow mines is trifling, the probabilities of gain very great, and the enterprise divested of all speculative character, thus rendering it a safe investment for capital. Ere long there will be a group of rich mines opened upin this hitherto overlooked part of the Gwennap district, vieing with any yet discovered in the neighbourhood, some of which have proved the most productive in the county of Cornwall.

St. Day, May 17. CHAS. BAWDEN.

MINING SHARES—PENNERLEY AND GLYN.

SIR,—The different replies and comments which have appeared in answer to my former letters on these mines and shares have been both amusing and interesting, but all have failed to answer the one important enquiry respecting the value of the late discovery of lead at Glyn. "A Shareholder" evades the question, but informs us that the Glyn will soon equal the Van in value and dividends. Another well-informed correspondent is able to correct us as to the number of shares issued in the mine, but says not a word as to the value of the discovery. In last week's Journal still another champion appears on behalf of the Glyn Mine, but instead of giving a reply to the very simple question—which, no doubt many of your readers would be glad to see satisfactorily answered—presumes that I am acquainted with the relative position of Glyn and East Van, and after dilating upon the riches of the Van lode (a subject, by the way, which has been rather overdone), concludes with the valuable information that one-fifth of the Glyn shares are held in the vicinity of the mine.

Now, in answer to "Justitia," I wish to say that it so happens that I am particularly well acquainted with not only "the geographical aspect of the several mining properties," but I believe I am now in a position to judge as to their relative values and future prospects, and I see no reason to alter my opinion as regards Pennerley, neither have I discovered anything to induce me to consider the late valuable discovery at the Glyn to be more encouraging than it would appear from the manager's report of the 8th inst.; it must not, however, be concluded from this that I have any but a good opinion of the latter mine; and, although I cannot go so far as some of your correspondents in its praise, I think it may be considered a speculation of more than ordinary promise. Of course, both time and capital to no small extent must be expended before it can possibly become a profitable concern. A CAUTIOUS MAN.

May 18.

THE MID-CORNWALL MINES.

SIR,—I find that all the property of the late Mid-Cornwall Mining Company, lately advertised in the Journal for sale by tender, has been disposed of to Capt. D. Cock, of Roche. The property consists of the leases of Hallew Iron and Tin Mine, and of Burney House, Cornubia and Lanjew Mines, with the machinery and materials thereon, the particulars of which may be seen in a late *Mining Journal*. Capt. Cock made the purchase with a view to working some of the mines, particularly Hallew Iron, which is regarded as the best in Cornwall, and the lode is of unusual width. I understand that Capt. Cock is connected in business transactions with some of the great Welsh ironmasters, so that he has a market ready for the reception of any amount of iron ore, because the quality is so superior to iron ores in general. The price at which Capt. Cock became possessed of these mines has not transpired to the public, but it may be properly assumed that a person of Capt. Cock's penetration and intimate knowledge of the property would be sure to make a good bargain for himself and friends. He is now a very large employer in Roche and adjoining parishes, where he has numerous clayworks and some freehold land. In riding in company with a merchant yesterday, we had a conversation on clayworks, mines, &c., when he said, "I am glad to find that Capt. D. Cock is prosperous, he deserves it, he is honest and honourable, what we call a 'straight' man." I said, "I agree with you. I wish I had found all mining people with whom I have had to do business of like character. I have found some of them very crooked, particularly one broker in London." The working of the mines referred to will confer a great boon on the inhabitants of the district, where labour is much wanted, there being no mine now at work in the locality. A year or two ago there were about 10 mines at work, but fortunately the clay trade is very brisk, and on the increase. R. SYMONS.

Truro, May 12.

WEST CHIVERTON, AND ITS MANAGEMENT.

SIR,—The attribution of honour wherever honour be due is a widely different thing to ascribing effects to wrong causes. Unfair would it be to Capt. Southey even to desire to denude him of the fullest meed of praise for his laudable efforts to revivify the successful career of West Chiverton; more unfair to him, however, is to endeavour to place to his credit results with which he has had nothing whatever to do, and concerning which, as a sensible man, Capt. Southey should at once set himself right with the shareholders. The greatest insult to one's common sense is false adulation, and if Capt. Southey is to be held responsible for the exceptional and apparently temporary advance in the price of blende, by which the profits under the new management have been mainly realised, we presently shall have Capt. Southey blamed when blende has once more receded to its normal value.

Your correspondent, "An Old Shareholder," first tells us—"that notwithstanding the price of blende has so materially fallen off during the last quarter, yet the returns and profits are equal to the previous quarter." He then says—"that evidently West Chiverton is not so dependent on this mineral as some would aver," and "that it must certainly be a source of considerable satisfaction to all concerned with this great undertaking to know that when one kind of mineral falls off the other makes up the deficiency." It is not easy to comprehend what the writer means, because we are told, in the first instance, that the "returns were equal to the previous quarter," and then, that "when one kind of mineral falls off the other makes up the deficiency." Does your correspondent mean that the blende returns are decreasing, and those of lead increasing; if not, what does he mean?

"The manager has recently purchased one-sixth of the mineral rights of the Manor of Ventomgimps, wherein the mine is situated; this of itself speaks volumes for the future prosperity of the con-

cern." These are the words of your correspondent; the "indomitable pluck and energy" for having entered into this speculation your correspondent admires, but his hope that it "will be rightly estimated by the lords and shareholders," cannot possibly be realised as long as we are without the knowledge of the conditions and price upon which "one-sixth of the mineral rights" have been purchased. The policy of the manager holding an interest in the royalty of the mine is open to very grave objections, which need not here be urged, but, as I have already said, to enable anyone to "rightly estimate" it cannot be done without the necessary means with which to do it.

ONE WHO HAS KNOWN WEST CHIVERTON FOR MANY YEARS.

Liskeard, May 16.

WEST TANKERVILLE MINE.

SIR,—There has of late been a great deal written about the value of numerous mining shares, but this property appears to have been sadly overlooked by investors and others. What I wish to draw attention to more particularly is the preference shares, which receive 15 per cent. accumulative dividends, and there is at present at least 10s. due on them. Yet these shares are to be had for the same price as the ordinary shares. I, therefore, advise all interested to exchange their ordinary for preference shares; I have done so myself, as likewise my friends. In the event of a higher dividend than 15 per cent. being declared, these shares can at any time within four years from the formation, or 2¼ years from the present time, be exchanged for ordinary shares, share for share. I may add that about two months since I was at the mine, and had a good exploration underground, as well as a minute inspection at the surface. I was very well satisfied indeed with what I saw. From the situation of the property there ought to be a great mine here, and it will not be from the want of good management nor a vigorous development if it is not a success. The mine at south boundary shaft is certainly opening up well, and is nearly at the level that Roman Gravels became so rich.

A SUBSCRIBER.

FOREIGN MINING AND METALLURGY.

The hopes conceived of a revival in the French iron trade have proved only deceptive. Some still think, however, that the pig-iron trade has rather improved; some rather important orders are stated to have been received for casting pig. Pig for refining has remained neglected; prices have been maintained, but only with difficulty. At Paris the iron market has been pretty well supported, thanks to the more hopeful feeling prevaing in the building trade; merchants' iron has brought 8*l.* 8s. per ton. The Manosque Mines and Ironworks Company will pay, on June 2, a dividend for 1875 at the rate of 5 per cent. per annum.

Notwithstanding the alleged depression of the German coal and iron mining industries, several of the leading Westphalian companies appear to be realising fair profits. At a meeting of the Arenberg Coal and Iron Company, held on April 29, a dividend of 10 per cent. was declared for 1875. The quantity of coal raised during the year was 291,220 tons, the average cost of production being only 6s. 2·92d. per ton, against 8s. in the previous year. The Aplerbeck Company is expected to pay a dividend of from 7 to 8 per cent. for 1875, against an average dividend of nearly 18 per cent. per annum during the preceding four years. The Mechernich Mining Company gives a dividend of 6 per cent. for last year, after carrying forward 3000*l.* to the reserve fund. In the Bochum district nearly all the mining companies have also paid good dividends. As an indication of the present state of the German coal trade, it may be stated that during the first three months of this year the Gelsenkirchen Company raised 146,864 tons, at a profit of 23,734*l.*, or 3s. 6d. per ton. In spite of these signs of moderate success there are loud complaints in the German ports of the severe competition to which German coal is subject from English imports. This is largely aided by the low sea freights now prevailing. Reports from Newcastle state also that English coal is being shipped to the Continent in nearly every case at a loss. Be this as it may, it is certain that the Board of Trade returns show that English coal is being exported in larger quantity than it has ever been before.

A review of the Belgian trade returns for the first quarter of the present year, published in the "Moniteur Belge," presents some interesting particulars of the relative positions of Germany and Belgium in regard to the iron and steel trades. According to the figures given, the Belgian exports to Germany show a noteworthy decline, while, on the other hand, the imports from the Empire have considerably increased. The Belgian imports of steel and steel goods from Germany were 874,433 kilogrammes in 1874, 643,088 kilos. in 1875, and 1,120,775 kilos. in 1876. The increase under this head is chiefly due to supplies of crude cast-steel, the figures for the three years being 61,772 kilos., 30,550 kilos., and 425,551 kilos. respectively. On the other hand, Belgium has exported to Germany—in 1874, 554,473 kilos.; in 1875, 149,357 kilos.; in 1876, 181,493 kilos. The decline is owing to Germany having taken a less quantity of steel manufactures, only 168,569 kilos. in 1876, against 460,301 kilos. in 1874. Germany has also sent to Belgium 34,884,000 kilos. of crude casting iron, wrought-iron, wire-iron, rails, sheet-iron, and iron manufactures, against an average of about 17,000,000 kilos. in the two preceding years. The German exports to Belgium of crude casting-iron alone have increased from 9,000,000 kilos. in 1874, and 15,800,000 in 1875, to 33,990,000 kilos. in 1876. The Belgian exports of iron and iron goods to Germany, on the other hand, have declined from 9,500,000 kilos. in 1874, and 5,500,000 kilos. in 1875, to 4,500,000 kilos. in 1876. The total of the German exports to Belgium under the heads referred to (36,014,209 kilos.) shows an increase of about 17,500,000 kilos. since 1874, while the total of the iron and steel imports from Belgium (4,690,000 kilos.) shows a decline of about 5,330,000 kilos.

There has been little change in the general aspect of the Belgian coal trade, and it is now tolerably evident that there will be no revival in affairs until the winter, and that, apart from the sugar-works, the other industries of Belgium will consume comparatively little coal during the next few months. It had been hoped that metallurgical industry would acquire some activity, and that some blast-furnaces would be re-lighted, but this hope has been disappointed, and of late almost complete depression has prevailed, and only continual complaints are heard, while the comparatively few purchasers who present themselves are very exacting in their tone. The Liége and Maestricht Railway Company has announced an important reduction in the price of coal coming from the Ruhr basin, and intended for certain industrial localities in the Mons basin. The washed coke of Westphalia is thus delivered in Belgium at remarkably low rates. The importation of coke from the Ruhr district appears likely to increase, although Belgian consumers complain that it contains much sulphur and phosphorus, and is not so compact as Belgian coke. The Centrum, one of the Ruhr collieries, is delivering its coke at 16s. 10d. per ton at Charleroi and Liége; the question is whether the cheapness of the Ruhr coke outweighs its secondary mediocre quality.

There has been little or nothing of a novel character in the French coal trade; prices show hesitation, and the season exhibits more deadness than ever. Orders for the sugar works are still looked for. It appears that in 1875 the Grand Combe Coal Mines Company produced 565,000 tons of coal, or 48,000 tons less than in 1874. The difficulty experienced in disposing of the coal sold was the sole cause of the decline in the production, as the means of extraction at the disposal of the company would readily allow it to carry its extraction beyond 600,000 tons annually. Notwithstanding that the production at the company's mines was slightly reduced last year, the company's stock of coal increased from 17,455 tons of coal at the commencement of 1875 to 37,038 tons at the commencement of 1876. The rough profits realised by the company last year amounted to 129,157*l.*

With regard to the Belgian iron trade, it may be observed that there are many would-be sellers, and few buyers; this is the general characteristic of the situation. The confidence which existed some time since appears to be shaken, and some works which have run short of orders are only making for warehousing. The building trade gives a few orders to the forges, but it absorbs only a small portion of the general production. Many blast-furnaces have been blown-out in the Charleroi basin, and there is not much hope of their being re-lighted for some time, as the use of iron rails is declining from day to day. The workshops devoted to the construction of railway plant, engines, &c., are not much better off for work than the forges; there are some few exceptions to this remark, but the prices obtained remain unremunerative. The State Railway Commission is about to let a contract at Stuttgart for 450 tons of Bessemer steel fish-plates, 80 tons of bolts, &c. The administration of the Danish State railways at Aarhus is about to let a contract for 1200 tons of rails. The Belgian Metallurgical and Colliery Company is constructing at Tubize some tramway engines which are to consume their own steam and smoke.

Copper has been scarcely so firm upon the principal markets. At Paris Chilian in bars, delivered at Havre, has made 85*l.* per ton; ditto, ordinary descriptions, 83*l.* per ton; ditto, in ingots, 86*l.* per ton; English tough cake, 86*l.* per ton; and pure Corocoro minerals, 87*l.* per ton. The aspect of the German copper markets has scarcely changed, as well in respect of prices as of the amount of business passing upon them. The Dutch tin markets have remained firm; Banca has been maintained at 49 fl. to 49¼ fl., and Billiton at 44⅜ fl. to 44¾ fl. The Dutch Society of Commerce has announced a sale of 29,300 ingots of Banca for the 31st inst.; of the tin thus offered 9500 ingots are stored up at Rotterdam, 18,500 ingots at Amsterdam, 500 ingots at Dordrecht, and 800 ingots at Schiedam. At Paris Banca, delivered at Havre or Paris, has made 87*l.*; Straits ditto, 78*l.*; and English, delivered at Havre or Rouen, 78*l.* per ton. The German tin markets have ruled tolerably firm. There has been a pretty good demand for lead at Paris. French, delivered at Paris, has made 22*l.*; Spanish, delivered at Havre, 21*l.* 16s.; and English ditto, 21*l.* 14s. per ton. The German lead markets have been pretty well supported. Zinc has not varied materially upon the Paris market. Silesian, delivered at Havre, has made 25*l.* 12s. per ton; and other good marks, 25*l.* 4s. per ton. The German zinc markets have ruled firm, but there has not been very much business passing upon them.

Meetings of Public Companies.

ECLIPSE GOLD MINING COMPANY.

A general meeting of shareholders was held at the London Tavern on Thursday,—Mr. ROBERT ULLOCK POTTS in the chair.

Mr. F. R. BLUETT (the secretary) read the notice convening the meeting.

The report of the directors (which appeared in last week's Journal) was taken as read.

The CHAIRMAN said the report of the manager and that of the directors were so exhaustive and explicit that the shareholders possessed all the information yet to hand. Notwithstanding the great progress made with the various works at the mine, the directors regretted they were not yet completed; delays had arisen from the absence of the necessary funds, and from two or three winter months of unusual severity, which interfered with the working of the mill. Had their operations commenced during the summer months, of course the hauling difficulty would not have occurred; still, he thought it quite as well this difficulty had arisen at the present time, because in their future operations they would be able to guard against it. The directors were very sanguine that the works now in hand would be completed by the end of June, from which time moderate profits would be made. In confirmation of this opinion the directors had made themselves responsible for the works now in hand to the amount of 1000*l.*; if the result should prove as the directors expected there would be no difficulty in raising the necessary funds for the further development of the property. The shares and the debenture bonds were principally held by the directors, which was the best possible evidence they could show of their great confidence in the success of the undertaking. Mr. Willett would afford the fullest information as to the state of the work and the prospects of the enterprise. Upon his return from the mine, Mr. Willett wished very much to call the shareholders together, but as the general meeting was to take place so soon the board considered it scarcely worth while to have a second meeting. Mr. Willett bore testimony to the great exertions of the manager; and all who knew anything of the property were as sanguine as ever as to its success. He then moved that the report and balance-sheet be received and adopted.

Mr. HULBERT seconded the proposition. The person who could form the most accurate judgment as to the success of the mine was the manager; and he had said in his own report "When you are prepared to develope the mine, I will find my share." The next competent person was Mr. Willett, who had twice visited the property. Mr. Willett said, "When more money is wanted, I am prepared to find 500*l.*" The next persons must be the directors, who are behind the scenes; the directors and their personal friends held five sixths of the shares and debenture-bonds. Generally speaking, in public companies it was very different; mostly, the directors were qualified and took their fees, the shares being nearly all held by the general public. He saw there were no less than six shareholders of the same name as their Chairman; he (Mr. Hulbert) was prepared to follow Mr. Willett's example by advancing 500*l.* when the money was required. The last month's cost-sheet showed a small profit on the operations, the quartz treated yielding 34s. per ton, the satisfactory feature being that this result had been obtained from waste stuff, and without the necessary appliances. Taking all things into consideration, very satisfactory progress had been made; and those who knew most about the success of the mines were prepared to put their hands into their pockets, and find the capital required.

Mr. WILLETT said—If you will give attention for a few minutes I will endeavour to give you an account of my visit to the property, also an idea of what has been done, and what there is remaining to carry out before we shall fully reap the benefits of our exertions and our money invested in the concern. I have no hesitation in saying that if you will listen attentively to the enormous difficulties we have had to encounter, and the reasons which prompted us to persevere through those difficulties, not only to keep possession of the property, but to make it a great success, a success which I am confident with a little patience and financial assistance will be not only satisfactory but permanent, you will give us all credit for the exertions and anxiety we have gone through. I arrived at the company's property early in November last; I should have been there before, but the steamer I left in for New York sprung a leak in a severe gale, and we had to put back. I was delayed in this way nearly three weeks. However, I arrived safely at the mine, and I resided there for two months, and during that time, with the exception of three days, I never left, but watched carefully the whole operations of the property, so that I am in a position to speak with some authority on the subject. Now, in order to give you an intelligible account of our position, I propose to treat of our property under five heads. They are as follows:—1. Mine.—2. Tramways.—3. Canal, or water power.—4. Mill.—5. Tailings. As regards the mine, I can only repeat what, perhaps, you all know—that it contains a practically inexhaustible quantity of ore, varying in value from $5 to $25 a ton; the ore is highly oxidised, containing a quantity of base metal, and also some very fine floury gold. I wish to call your attention particularly to the nature of the ore as I have described it, because when I treat of the mill I shall have to call your special attention to it, and I may, in fact, say that our success almost entirely depends on a just and accurate appreciation of the nature of the quartz. There is a quantity of galena ores in sight, value about $80 to $100 a ton. A gentleman whom we employed to examine the mine estimates the amount in sight at 5000 tons, but on this point I cannot speak with confidence, as it requires a person accustomed to the working of the mines to give anything like a correct idea of the ore in sight in this property. We have driven about 300 ft. on the lode, and are still in limestone, but there are indications that we are approaching the granite formation. All the mining experts say that on our entering the granite formation the lode will become much richer, and there is no doubt that had we funds we ought at once to sink, because it may turn out rich, and the utmost confidence is expressed that we are near very valuable ore. We have no means, however, at present to do anything. I am sure that 1000*l.* laid out in sinking is the right thing to do, because as we sink in the lode we get all the time our present average rock, and it would be most satisfactory to know what we have on reaching the granite formation. I hope the shareholders will bear this important thing in mind. There is a large body of ore south of the shaft; this ought to be driven on also. In reference to this Capt. Eudey suggested years ago that an attempt should be made. No water is in the mine, and scarcely any timbering is required. In speaking of the mine one may almost say that it is hardly opened. We know what we can count on, and there is reason to suppose we may strike, provided we have means to explore, rich ore.—Trams: It must be obvious that with the class of ore the value of which I have said averages (say) $12 or $15, cheap working is absolutely necessary. The cheap transportation of our rock could only be obtained in a country where sage brush and sand cover the ground by means of a tramway. I am glad to tell you that, through the praiseworthy exertions of Capt. Eudey and his brother, we are in a position to transport our rock at 60 cents per ton; and if money had been subscribed for iron instead of wooden rails, and with a small locomotive, we could do it at 40 cents per ton. When the time arrives, as I trust it soon will, that we are running 50 stamps iron rails must be laid down. All the time that we crush 20 tons or less our present tram will satisfy our requirements. But the heat in the summer months causes the wooden rails to contract, so that frequently the cars run off the track, thus causing considerable delay in the transit of the ores from mine to mill. The mountain tram is 2000 ft. in length, extending from the mine dump to the dump at the base of the mountain. It works admirably, but it costs us much time and money. There are two iron cars connected with wire-rope; the loaded car pulls the empty one up, the tram being thus self-working. With iron rails on this tram we can easily send down 100 tons of ore per day. The valley tram connects the dump at the base of the mountain with the mill. We have nine cars running, and each car carries about 1 ton; two strong horses can bring the nine cars loaded to the mill in about 1½ hour. We have, therefore, a perfect communication between mine and mill; the result of this complete communication is that instead of paying $4 a ton for carrying quartz, as in the old company, we do it now for 60 cents a ton.—Canal: Passing from our tramways, the next important thing to ensure cheap working is an inexpensive motive-power to drive the machinery of the mill and to furnish a good column of water to the mill; our canal is almost five miles long, and answers in supplying the mill with an ample and regular motive-power. I may here state what, perhaps, some of you may not have heard—that the Eclipse property was abandoned by its first owners because they could only just make it pay expenses, having to pay not only heavily for transporting their ores, but also very largely for wood to supply the steam-engine to drive the mill; by our tram and canal we escape these heavy penalties. The winter just past was abnormally cold, and the canal was frozen over, and great fears were entertained lest the bank should give way from the force of masses of floating ice. Operations were stopped, all hands were placed to watch and remove collections of ice, and the banks stood perfectly, so that I trust we need have no fear on account of any mishap, although, if we had a superfluity of funds, it would be well to strengthen the banks by sowing grass and placing young shoots of willows in them, the roots of which would in time afford unfailing support. The Eclipse mill, as far as stamping power is concerned, is amply equipped—we have 30 stamps in efficient working order. We have spent a considerable sum in properly covering in the mill to protect the machinery from the sand which occasionally in severe weather is blown up and down the valley in dense clouds. We have in position four pans and two settlers, and two Knox pans for cleaning amalgam, and if ours were a small mill and a small mine, and our whole property was on a small scale, we might well be content to remain as we are. But, instead of everything connected with the mine being on a small scale it is the reverse, and we must, if we are to pay large and regular dividends, place additional bullion-saving machinery on the mine in the form of more pans and settlers. In talking of pans and settlers, I must revert to the nature of the ore. The two prominent characteristics are—first, that it is so highly oxidised that unless it is cleansed in the pans the particles of gold, being covered with rust, in coming in contact with the quicksilver do not amalgamate; secondly, the particles of gold are so fine and floury that an adequate time must be given them to precipitate in the settlers. Our present number of pans and settlers is barely sufficient to keep five stamps running day and night. The pulp must be worked for a certain time in the pans to enable the mullers which revolve in the pans to pulverise very finely and cleanse the ore, and sufficient time must be given to allow precipitation in the settlers. Now, if you will allow me, I will just read an extract from Capt. Eudey's report, published nearly three years ago:—

"In fact, it must be seen and allowed by all thinking men on the subject of gold saving that ore containing such a vast quantity of rusty brown matter, principally an oxide of iron, interspersed with gold of very minute particles, that it necessitates a suitable process to prevent loss of same, and different altogether to mere stamping, and leaving the sand or pulp to run away with the stream after passing over copper plates, galvanised with quicksilver, with nothing else of moment to catch the gold, like the Eclipse managers did. That such would prove ruinous should have been plainly seen, especially when it was known that the original owners of the mine complained of not having machinery enough for purposes required; and, notwithstanding they used four pans for grinding and settlers for amalgamating with only 10 stamps, they had then to hang up five out of the number half of the time for the want of more machinery suitable to the requirements of the lode."

Now, having heard this, you will naturally say how is it that, knowing this, Capt. Eudey did not have the mill properly equipped before starting? I will, if you will allow me, finish the subject of the mill and the tailings, and then will explain Capt. Eudey's conduct as regards this matter. In order to assist amalgamation in the pans heat is necessary. That we might save expense we tried to construct a boiler to furnish steam, but the sheet-iron we had on hand was not of a sufficiently good character to make the ends, and we are, therefore, compelled to remove a large boiler from another part of the property for that purpose, and I hope by this time that the pipes are connected between the boilers and pans. As our mill now stands we could not furnish one equal to it for a sum of money less than 6000*l.*, and as our share capital is only about that, we surely need not hesitate to add what is necessary. I will now pass on to the subject of tailings, and this will not take long to discuss. With our own and those left by the late company there cannot be much less than 1000 or 1500 tons, and their value may fairly be represented as equal to 3000*l.* or 4000*l.* Now we have no means of working them, and no funds to provide means. I think for 500*l.* we might erect the proper machinery, and as we shall continue to augment the amount of tailings in hand it is most urgent that we should utilise them. You will now observe that I have treated of all the various departments of the Eclipse property; and if I may sum up the result of my statements is this—we have a practically inexhaustible quantity of ore, we have cheap transportation of our ores, we have a most inexpensive motive power, we have an admirable mill so far as stamping-power and capabilities are concerned; but, and here is the one great thing we are deficient in, and yet it is the most important, our gold-saving apparatus is most insufficient, or in other words we require an addition of 10 pans and four more settlers to work up 35 tons of pulp in the 24 hours, and to make a profit by so doing of 1*l.* per ton. To do this and carry out other necessary improvements would require a sum of about 3500*l.* I have gone very carefully into the matter of working expenses, and leaving out the mining and transportation, for which there is a fixed charge, it costs comparatively little more to run 30 stamps than it does to keep only 10 to 15 employed. We have to pay our manager the same, and other officials just the same, whether we work 10 or 30 stamps. Having finished my account of the various operations in connection with the property I will now proceed to give an explanation of Capt Eudey's conduct in starting before the mill was equipped, and I will at the same time mention the very great difficulties he has had to encounter during the past few months. In order that you may have a better conception of what I am about to state, I must remind you that when the present company was started the sum estimated to purchase the property and put it in proper order was 20,000*l.*; this sum included the cost of iron rails for the tramway. Notwithstanding our exertions all the capital we could raise was about 6000*l.*; this enabled us to pay 3000*l.* of the purchase money, and repair the canal, pay preliminary expenses, and other minor things. As time went on, and as swindle after swindle was exposed, the public very naturally had a distaste for embarking in any mining enterprise, and it seemed as if we must give up from want of means. Capt. Eudey knowing the value of the Eclipse property, and feeling also what a large prospective value was attached to it, determined that he would sooner than we should give up the property make a desperate effort with a small sum of money to place it in that position that the shareholders might have a small dividend earned, and that they would then be induced to complete the various works necessary for a permanent success. In order to find this sum of money debentures were issued bearing the high rate of 20 per cent. interest; this money, by very great exertions on behalf of Capt. Eudey, enabled the various works which I have described to be undertaken and brought to a satisfactory conclusion, but it was absolutely impossible to find the requisite gold-saving machinery for the mill with this amount of money. Hence we started with only four pans, and those without heat applied to them, but a greater difficulty there was even than this. There was no working capital. We had to pay wages and salaries, and we had no money to get a good stock of clean ore from the mine. Capt. Eudey was obliged, therefore, to take most of the ore he crushed from the dump left by the old company, and which experience now proves to be so mixed with limestone that it does not pay to work. This was no fault of Capt. Eudey's. He quite depended on this ore to start with, and thus save to a great measure the use of working capital. The country there is so sandy, and the dump had been so long exposed to the dust and sand, that it was almost impossible to say what the nature of the dump was until it had been tried in the mill. When we are in full working order we can mine our ores, transport them to the mill, and work them there at a total cost of about $7 a ton. Now, even with our imperfect mill, with mixed quartz, and with almost everything against us, we have made the ore yield $8½ a ton; $8 or $9 a ton with our present mill, and with the ore that has been passed through it, is equivalent to $10 or $12 with clean rock from the mine and with a properly equipped mill. The assays of our present tailings bear witness to the loss of gold which we are sustaining by rushing the ore through the mill. Not that the gold is ultimately lost, because we shall work the tailings eventually, but it is much better to work the pulp slowly at first, and thus save the great expense of re-working the tailings, but this we can only do by adding more pans and settlers to the mill. Capt. Eudey knew perfectly well that the money raised was insufficient to put the mill in order, but he thought sooner than loose the property he would show what could be done, even with an imperfect mill, and that with a cheap motor power and cheap transit for our ores we could pay our way until the company were satisfied to put the mill in efficient order. I am perfectly satisfied that when the mill is properly equipped we shall make not only good but permanent dividends. Want of capital has been our great drawback. We could not afford a good engineer to help Capt. Eudey, consequently the whole of the works and the mountain tramway—a truly gigantic undertaking—has been the work of Capt. Eudey, assisted by his brother, and it does them very great credit. As regards labour, the difficulty is not that of getting

mining labour, but hands to work in the mill. When we started there was not a hand that had ever been in a quartz mill before, and Capt. Eudey had to teach them how to feed the stamps, and to attend the pans and settlers. Now that the character of the waste dump is ascertained, the only thing we can do is to extract as much as we can from the mine, and work them slowly in the mill. If the waste dump had been good average ore, from the quantity there is extracted (some 2000 tons) we should have been enabled to crush 20 tons a day, and put up with the waste which would be caused by rushing it through the mill, because all that the ore would have cost was 60 cents per ton for transportation to the mill. You will be very glad to learn that the Southern Pacific Company have so far pushed on their line that in July next they will be through the mountains, and we shall be only 30 hours from the nearest point at the Tahachipi Pass. I got an introduction to the vice-president of the Southern Pacific Railway, and he showed me the plans of the intended route, and the line intersects our tramway, so that unless any alteration is made our property will be most materially enhanced in value; in fact, it is almost impossible to exaggerate the good that the railway will do us. We shall be able to send our ores to the coast at a cost of $10 a ton, against a cost now of $60. Labour will be cheaper by 5½ per cent., and we shall reap all the advantages which railways have given to other properties. Before sitting down it is only an act of justice to Capt. Eudey that you should be informed by one who was an eye-witness of the arduous labours he has gone through. From six in the morning till nearly midnight, day after day and week after week, did he work as I never saw man work before, and when you consider that he had to keep a vigilant eye on the various works of the company, and that in going round them he had to cover a space of nearly 14 miles, and that he had not a man to assist him in the mill, and when you know that up to this time there has not been a single break down, I feel sure that you will agree with me that he is deserving of our best thanks. Amongst a certain class of people Capt. Eudey is not liked, but that is because he protects our interests, will not allow us to be swindled, and because he makes the men do a dollars worth of labour for a dollar. That Capt. Eudey is not perfect I am fully well aware, but I know this, that without him we should never be in the good position we are now, with every hopeful prospect before us as soon as ever we are able to do what is so urgently wanted—namely, properly to equip our mill.

The report and balance-sheet were received and adopted.

Mr. S. J. WILDE proposed the re-election of the retiring director. He (Mr. Wilde) was not an original director, and therefore naturally looked into matters very closely; he must say the directors and manager had done everything they possibly could with the money at their command. What was wanted was more money; it was unreasonable to expect the directors to go on subscribing capital if the shareholders themselves did not also come forward.

Mr. H. STAPLES seconded the proposition, which was put and carried.

The CHAIRMAN thanked the shareholders for his re-election, and assured them that no effort would be spared to secure the prosperity of the company.

Mr. WILLETT, in reply to a question, said all that was required was additional bullion-saving machinery, which would cost about 2500*l.*, and some working capital for sinking, as the explorations were not more than 100 yards from the granite formation.

The auditor was re-elected.

Special votes of thanks were passed to Mr. Willett and the manager, Capt. Eudey.

A vote of thanks was passed to the Chairman and directors, which closed the proceedings.

IFTON-RHYN COLLIERIES.

An extraordinary meeting of shareholders was held at the City Terminus Hotel, on Friday (yesterday)—

Major-General DAVISON in the chair.

The report of the directors stated that the various efforts to raise the necessary additional capital for the successful development of the company's property having ended in failure, and the period named in the mortgage deed for the redemption of the mortgage on the company's property having expired on May 1, the directors have no alternative but to convene a meeting to consider the propriety of voluntarily winding up the company. The directors have had submitted to them a proposal for the reconstruction of the company, but they hope that by the time of the meeting it will have been matured into such a complete state as to warrant its being laid before the meeting. The directors' views are that under any circumstances it is expedient that the resolutions to wind up the company voluntarily should be passed, as it is impossible to continue the company's operations under the existing circumstances. They consider some form of reconstruction will be more likely to be for the benefit of the shareholders than a public sale, and that a reconstruction can be better carried out by means of a voluntary winding-up, subject to the supervision of the Court, than by any other means.

The CHAIRMAN said he need not take up the time of the meeting with any lengthened remarks. The shareholders had been already made fully aware of the position of the company and the purpose for which they were convened, therefore he would content himself by proposing that it having been proved to the satisfaction of the company that it cannot by reason of its liabilities continue the business of the company it is advisable to wind-up the same, and that the same be hereby wound-up voluntarily.—Mr. JONES seconded the proposition, which was carried unanimously.

Upon the proposition of the CHAIRMAN, seconded by Mr. BEVILLE, it was resolved that the company do consent to an order on the petition to continue the voluntary winding-up, subject to the supervision of the Court.

The CHAIRMAN said the shareholders had received a circular from Mr. Good, containing a scheme of re-construction.

Mr. GOOD explained that on the appointment of the liquidator he would immediately provide the necessary funds to continue the collieries while he is arranging with the lessors, the railway companies, and others for such modification in the leases and improvement of the outlet for the coals as are required to render a reconstruction successful. In order to prevent a sacrifice of the plant he must be prepared to pay or otherwise satisfy the amounts due up to Midsummer for rent, mortgage, interest, and dead rents. He would obtain from the old shareholders, or others, the promise of sufficient subscriptions to cover the outlay required for certain works, amounting to 11,500*l.* He had calculated what profit might be expected after this expenditure, and believed it will be sufficient to pay 15 per cent. on the fresh capital and leave something for the deferred shares, but it would be much increased by a larger output and market. When he saw his way to this amount of capital he would form and register the new company, and have an agreement prepared for the sale of the collieries, &c., to it, which would be submitted for the approval of the present shareholders.

Rev. Mr. CLIFFORD proposed that Mr. Good should be appointed liquidator, suggesting he should have the power to wait on the lessors with a view to get them to agree to more favourable terms of royalty and dead rent. It was impossible for the company to go on as it at present stood, although he must confess Mr. Good's estimate was somewhat sanguine.

Mr. FIELD seconded the proposition.—Mr. LIMBERT opposed.

Major LITTLE thought Mr. Good's estimate unreliable. He did not think fresh applications for money to the old shareholders would be responded to.

Mr. JONES (a director) said that perhaps the shareholders would like to know the opinion of the board on the subject; it was this—they wanted something more than a promise from Mr. Good. If Mr. Good would deposit 10,000*l.* in the names of trustees the directors would be willing to support Mr. Good.

Mr. S. L. Price (Price, Waterhouse, and Co.) was proposed as liquidator.

The CHAIRMAN as an amendment proposed, and Mr. JONES seconded, the appointment of Mr. Breakspear, which was put, and carried.

A committee of supervision and consultation was appointed, consisting of Messrs. Jones, Smith, and France, to assist in the liquidation.

A vote of thanks to the Chairman and directors closed the proceedings.

GAWTON COPPER MINING COMPANY.

The general meeting of shareholders was held at the company's offices, Austinfriars, yesterday—Mr. E. HUNTER in the chair.

Mr. JAMES HICKEY (the secretary) read the notice convening the meeting, and the minutes of the preceding one, which were confirmed. The statement of accounts submitted showed that the total costs had amounted to 1485*l.* 10s. 3d., and the total returns to 1043*l.* 1s. 9d., leaving a debit balance of 442*l.* 8s. 6d.

Capt. ROWE read the subjoined report:—

May 17.—We beg to hand you the following report of this mine for the general meeting to be held on the 19th inst., showing the present position of your property and future prospects in opening up the eastern portion of this extensive sett, going into the hill at a depth of nearly 260 fms. below the surface, where it is reasonable to calculate on intersecting the rich shoots of ore discovered in the former shallow workings of the old mine; also the principal operations continued during the past four months, which are as follows, accompanied by the plan and section of the workings:—The 117 is driven east from the engine shaft 58 fms. 5 ft.; the lode in the end is of a very promising character, producing arsenical mundic, with good stones of ore. Morgan's winze, sinking below the 117, is down 8 fms. 1 ft.; the part of the lode carried in the deepest point is 4 ft. wide, principally composed of capel, spar, and peach, mixed with mundic and ore to the value of 5*l.* per fathom. The upper parts of the lode in this winze is worth in places 10*l.*, 12*l.*, and 15*l.* per fathom. The lode in the stopes in the back of the 117 is worth 10*l.* per fathom. No. 2 stope, in the back of the same level, is worth 6*l.* per fathom. The 105 is extended east of the engine-shaft 92 fms. 0 ft. 7 in.; the part of the lode carried in the end is 3 ft. wide, of a most promising character, yielding capel, spar, and mundic, intermixed with good quality yellow copper ore, and showing indications of improvement. The winze alluded to in our former reports, brought do wn from the eastern part of the drivage of the 95 above, has been communicated with the 105 near the end, which has thoroughly ventilated this portion of our workings, and facilitated our operations in working away the orey ground between both levels, where the lode is worth in places 6*l.* and 8*l.* per fathom. The drivage o the 95 has not been resumed since the last general meeting, which is driven 92 fms. east of the engine-shaft. The lode in the stopes in the back is the 95 is worth 12*l.* per fathom, and which is worked rather extensively. The 82 is extended east of shaft 101 fms. 1 ft.; the part of the lode carried in the end is 5 ft. wide, showing a very improved appearance in the last few feet, with a leading branch of good ore on the footwall side of the lode, yielding 1 ton of ore per fathom. This discovery we consider of some importance in our future prospects, it being the further most point east going into the hill towards the great cross-course, where we are looking forward to good results. The lode in the stopes in the back of the 82 is worth 8*l.* per fathom. The 70 is driven east of the engine shaft 85 fms. 4 ft., which should be resumed as soon as our position is sufficient to enable the speculative operations to be more vigorously carried out in this important part of the mine. The old orey ground in the back of the 70 is being worked on tribute at 12s. and 13s. 4d. in 1*l.* Under existing circumstances we think it most advisable to continue the present amount of operations, and at the earliest convenience increase our speculative points by extending other drivages and cross-cutting through the different parts of the lode at the various levels as they advance. At the same time special attention should be directed in using the most appropriate means available to increase our monthly returns by calcining all our mundic, and manufacturing the crude arsenic on the spot. A satisfactory arrangement could be made with the ords. We are busily engaged preparing for our next sampling, which we calculate will be about 170 tons of copper ore.—G. ROWE, G. ROWE, jun.

Mr. R. MCCALLAN enquired what would be the expense of calcining all the mundic—whether it would involve a very heavy outlay. He also wished to know whether they had done anything with the 105 fm. level since the date of Capt. Rich's report.——Capt. ROWE said that they had; indeed, they were now down to the 117 fm. level. The calcining was not at all an expensive process, but of course it would require an outlay for the erection of the kilns.

The CHAIRMAN regarded the outlay as considerable in the present state of affairs, and they as a committee had set their face against erecting calcining works until some satisfactory arrangement with the lords. He knew that Capt. Rowe was of opinion that it would bring them into profits at once, but the question was where was the money to come from to put up the kilns. They had been in communication with the lords, and they had kindly met them by remitting dues during pleasure. If the lords were disposed to meet them on further grounds the calcining question might be worthy of consideration, but they must have some encouragement to induce them to make the outlay.

Mr. HICKEY said that between 600*l.* and 800*l.* would have to be expended.

The CHAIRMAN had just had an estimate put into his hands by Captain Rowe, showing that to erect four kilns equal to 120 tons each would cost 60*l.* a piece, and other outlays brought it to over 600*l.* At present it was so difficult to get money beyond immediate requirements that there must be some special inducement to justify them in making the expenditure.

Capt. ROWE explained that the position of the several points of operation by means of the plan and section.

The CHAIRMAN, referring to their financial position, said that there was a little better prospect of the mundic return, and with the ore bills they had in hand, a 2s. call would suffice. They were only 36*l.* in arrear of call. He did not think that at present they should entertain the question of the calcining works.

The call was agreed to, thanks were voted to the lords for remitting dues, the committee was re-elected, and the thanks of the meeting having been given to the Chairman, the proceedings terminated.

SOUTH CARADON MINING COMPANY.

At a general meeting of shareholders, held at the mine, on Tuesday (Mr. THOMAS WILLIAMS in the chair), the accounts for the thirteenth month, 1875, and the first and second months, 1876, showed a profit of 913*l.* 15s. 1d. A dividend of 1024*l.* (2*l.* per share) was declared, and the balance of 2208*l.* 14s. carried to credit of next account.——After which the meeting was made special, to consider the resolution passed at the meeting held on April 28.—Proposed by Mr. THOMAS GEAKE, seconded by Mr. JOHN PEARCE, and carried unanimously—"That having received a communication from the Liskeard and Caradon Railway Company, refusing to accede to the terms proposed, no further steps for the present be taken in connection with the matter."

The following report was read to the meeting:—

May 16.—I am happy to inform you that the mine continues in a prosperous condition, and although there is nothing of any particular importance to notice, our prospects are such as lead us to believe you have a valuable and permanent property.—JOHN HOLMAN.

SOUTH CROFTY MINING COMPANY.

A three-monthly meeting of adventurers was held at the mine, on Tuesday. Mr. LEAN (the purser) presided, and read the statement of accounts, from which it appeared the labour costs for the three months had amounted to 2636*l.* 6s. 1d., and the merchants' bills, 1017*l.* 9s. 1d.: making together, 3653*l.* 15s. 2d. The credits were—For copper, 1902*l.* 4s. 5d.; for tin, 1161*l.* 1s. 6d.; arsenic, 450*l.* 5s. 4d.: total, less dues, 3422*l.* 11s. 11d., leaving a loss on the three months' working of 231*l.* 3s. 3d., and a balance against the mine of the sum of 1065*l.* 6s. 1d.

The CHAIRMAN said the loss on the quarter was so small that it was not considered necessary to make a call. The credits for copper were larger than they had hitherto been, and he hoped the returns would continue to increase.

The agents' report states:—The lode in the 205, so far as seen is nearly 4 fms. in width. The north part of the lode is of the best quality, and on this part we have been driving both east and west of Bickford's shaft. We have now opened on the lode at the 205 for about 6 fathoms in length. The western end is worth 12*l.* per fathom, and the eastern end 16*l.* per fathom. In the last 2 or 3 fms. sinking the lode very much improved in appearance and value, and as we believe that the junction of the south lode and Pryce's lode has taken place at the 205, we think there are good reasons to expect a still further improvement in sinking deeper. Having now opened a little at the 205 we shall commence to sink Bickford's shaft below that level after the present month. At the 160, east of cross course, we have found a large lode, which produces good copper and tin, standing by the side of old level. We are sinking below the 160, where the lode is worth for 9 ft. long 25*l.* per fathom. We are also rising over the 170 towards this, where the lode is worth for 9 ft. long 18*l.* per fathom. When this is holed a good piece of ground will be laid open for working. The 150, west of cross course, which is being driven on the north part of Pryce's lode, is producing a little tin. We expect an improvement in this end in driving further west, and intend to sink a winze under the 140 to communicate with this level, when some tin ground will be laid open that can be worked on tribute. The 180 cross cut, north of Palmer's shaft, appears to be driven through the lodestuff and branches that we met with just before the last account, the end being at present in clean granite. The total width of the branches, &c., was about 12 ft., containing good tinstuff mixed with granite, which also produced a little tin. We intend now to drive east and west on these branches, so as to prove their value. The 150 cross-cut is still being driven north towards this point by eight men as fast as possible, and we think there are excellent prospects of meeting with something good at this level. In the 70 cross cut west we have not cut anything of value. We propose to make some further trials for copper in this part of the mine, which is only as yet very partially explored.

Mr. ROBB, in moving that the report and accounts be passed, mentioned that in reply to the application of the committee Mr. Basset and Mr. Tyringham had consented to a reduction of the dues from 1 25th to 1 48th during the present depression, but they were still awaiting an answer from Sir Richard Vyvyan, the other lord. He hoped his reply would be as favourable as the others.——Mr. HARRIS seconded the resolution, which was carried, and on the motion of Mr. WHEAR, a cordial vote of thanks was given to the lords who had reduced the dues.

Capt. JOSIAH THOMAS, the managing agent, said the mine was suffering in common with others from the low price of tin, and they had been obliged to suspend the raising of their low quality stuff in consequence. If, however, tin went up to 80*l.* a ton they would be able to do very well. Their copper already discovered was holding out better than was anticipated, and would continue to hold out for some time to come. If they had a little money to spend in cutwork in the western part of the mine it would be a very advantageous expenditure, for there was a great deal of unexplored ground in that part; in fact, in the extreme western part of the mine, where the stamps were, there had been scarcely anything done under the adit, and he thought they had excellent prospects here, but it would require that some money should be spent.

Mr. ROBB said it was a curious feature in connection with the mine that whereas nearly everybody had supposed that copper was dying out and giving place to tin, they were constantly discovering copper, and their returns were increasing very satisfactorily.

Capt. THOMAS: And I believe there is plenty more copper in the sett if we only search for it.

The PURSER, in answer to a question from Mr. WHEAR, said their copper had realised about 300*l.* more in the past quarter than in the previous one.

Capt. James Johns having been appointed to Dolcoath Mine, Mr. ROBB proposed a vote of thanks to him for the valuable services he had rendered to South Crofty during his long connection with it. Capt. Johns was, he said, a man of considerable ability, and he had been unremitting in his desire to promote the welfare and prosperity of the mine.——Mr. PAYNTER seconded the resolution, which was carried unanimously.

A special meeting of the adventurers will be held in about three weeks, to appoint a successor to Capt. Johns.—*Western Daily Mercury.*

BANTRY BAY BARYTES QUARRY.—At an adjourned meeting, on Thursday, a quorum of members not being present the meeting was further adjourned, *sine die.*

ROMAN GRAVELS MINING COMPANY.

The sixth general meeting of shareholders will be held at the office of the company, on May 30, to receive the directors' and agent's reports, pass the accounts, and transact the ordinary business of the company. Mr. Tufnell Southgate retires by rotation from the direction, and Mr. Peter Watson from the auditorship of the company, both offer themselves for re-election.

The directors have much pleasure in laying before the shareholders the accounts for the year ending Feb 20 duly audited. It will be seen that in the year 2344 tons of lead ore have been sold, realising 25,145*l.* 1s. 6d., an average of 14*l.* 19s. 10d. per ton; and 20 tons of blende, at 3*l.* 6s. per ton, or 99*l.*, together 25,244*l.* 1s. 6d.; this, added to 3606*l.* 6s. 9d. brought from last account, makes a total of 28,850*l.* 8s. Of this amount there has been expended upon labour, materials, and management, 15,961*l.* 0s. 8d.; and for royalty, 2855*l.* 14s. 7d. During the year three dividends have been paid, amounting (with income tax) to 15,427*l.* 10s., and a further sum of 1600*l.* has been transferred to meet the expenditure upon permanent works, leaving a balance of 2076*l.* 2s. 9d. to be carried forward to next account. The works have been prosecuted with the utmost vigour throughout the year; a powerful engine has lately been purchased for the new shaft, and for the progress made at the various points the directors beg to refer to the subjoined report from Capt. Waters. In the course of last year a vacancy occurred at the board through the death of Mr. Thomas Clement Mundey; this vacancy has been filled by the appointment of Mr. Tufnell Southgate, a gentleman largely interested in the company. A further vacancy has since occurred in your direction through the retirement of Mr. Robert Oldrey, to whose unwearied attention to the best interests of the company the directors take this opportunity of bearing testimony.

In concluding an elaborate report on the state and prospects of the company, Capt. Arthur Waters says—"I look forward with pleasure to the future development of the mine, for with the new shaft completed, and in regular course of sinking below the 95, conjointly with the shaft now 6 fms. below the said level, in the north end of the mine, the next five years will see Roman Gravels down to the 145, with the different levels opened and in full operation with stopes, and so forth. The engine house for the new 60 in. cylinder pumping engine is progressing fairly; the parts of the engine are *en route* to and on the mine, and I hope to see the machinery ready to work by the time it will be needed. We are preparing to put up a small crusher with new jmachine jiggers, &c., for dressing the waste heaps and slimes, the accumulation of years, on the old floors. In conclusion, we are only just beginning to work this great mine, a statement which I hope to verify as the new shaft goes down."

NEW FOWEY CONSOLS.—All the works here are described as being in a satisfactory state, and the results so far achieved are of a most encouraging description. The mine consists of part of Old Fowey Consols Mine, which returned to the shareholders nearly 1,000,000*l.* from copper lodes worked on the south side of the cross course, and which were found richest in their junction there with. The operations of the present company have been chiefly directed to the north side of the cross-course, which is chiefly virgin ground. There are five tin lodes, of which two have been opened and proved; if winding machinery were erected these could be let on tribute at a profit to the company. The financial position of the concern is by no means bad, but the directors have no available capital, and therefore propose to issue to the shareholders 1000 of the unallotted shares at 1*l.* 10s. each, such shares to have a preference for dividend of 10 per cent. on the full amount thereof (equal to 20 per cent. on the price of issue) over all the other shares of the company

QUARRYING IN ANGLESEA—A HIGH COMPLIMENT TO A CONNISHMAN IN ANGLESEA.—An interesting affair took place at Penmon, on Friday, the 5th inst., during the visit of Mr. EDMUND SPARGO, the Consulting Engineer to the Anglesea (Penmon) Quarries, which are now being energetically developed, and are likely to prove at no very distant period one of the largest in North Wales. The quarrymen have much to thank Mr. Spargo for opening out these quarries, which even now have increased the employment and wages of the workmen in the neighbourhood considerably. A short time ago there were very few men employed, and at low wages, the highest for scabblers being only 2s. 8d. per day. Now there are between 70 and 80 men employed, and, owing to the introduction of contract work by Mr. Spargo, the men are making about 4s. a day. It has also proved beneficial to the proprietors, as they were previously paying 8s. per ton for getting out and scabbling the stone, the same description of stone being now done for less than 5s. The demand for the Anglesea stone is increasing far more in proportion than the quarries are capable of supplying. It is believed, however, that the Anglesea Consolidated Limestone Quarries, which are some of the oldest in the kingdom, and are situated only a short distance north west of the above quarries (belonging to and being worked entirely by Mr. Spargo), are about being reopened, and will, no doubt, in a short time largely assist in meeting such demand. These quarries when in full work will necessitate the employment of from 300 to 400 hands, which will greatly add to the benefit of the neighbourhood generally in many ways. These quarries have a seaboard and workable face of rock of some two miles in extent, and, as they have been already largely developed and possess a great many varieties of marble and limestone (from black, grey, and mottled to white) of the best description, and of the qualities now most in demand for every kind of architectural and structural purpose (blocks up to 30 tons being obtainable), besides possessing most convenient dock, shipping, and quarrying facilities, they must eventually form the largest and most extensive quarries in the kingdom. It is reported that a well known and one of the largest quarry proprietors in England, a resident of Newcastle on Tyne, is in treaty for this property. On the occasion of Mr. Spargo's visit to the Penmon Quarries, as above, the workmen there (between 70 and 80) took this opportunity of demonstrating their gratitude to Mr. Spargo, and their heartfelt appreciation of his kindness towards them. On his leaving the quarry he was astonished at being elevated on the shoulders of the men, and forcibly carried to his dog cart. The horse was then taken out of the vehicle, which, with Mr. Spargo, was dragged through the by-lanes to Llangoed (about two miles), amidst much cheering, and on to Beaumaris, a distance of nearly seven miles. The men entered by the Castle gates, and went through the town cheering lustily all the time, till they reached the sea front of the Bulkeley Arms Hotel. Mr. Spargo here attempted to return thanks, which was, however, impossible owing to the continued cheering of the men. They afterwards partook of some refreshment provided by the Messrs. Baker, of the Bulkeley Arms Hotel, where they evidently spent a pleasant day. The warmest feelings were expressed toward Mr. Spargo, showing the regard of the men as, in fact, it has always been. Mr. Spargo has been 19 years on the island, and during the whole of that time he has ever treated the men well, and has always been treated by them with the greatest respect and regard, which he is deserving of, having been the means of opening up much new ground for mining and quarrying in the island and in the neighbouring county of Carnarvon, thus affording employment to a great number of men.

THE MINERAL RESOURCES OF NEW CALEDONIA.—An interesting account of the discovery and working of nickel in New Caledonia is given by a Noumean correspondent of "La Houille," who states that gold was discovered there in 1870, and although nothing important has been done in connection with its working its discovery had an important effect, for in seeking deposits of gold copper mines were found, which are at present in full operation, rumour stating that these copper mines were discovered through a miner falling asleep and rolling down a ravine. When he awoke he found himself reposing on a bed of ore previously unknown in New Caledonia: copper had been discovered. Some time after there was discovered in a mountain within sight of Noumea, and called the Mont d'Or, a quantity of greenish stones, which upon analysis gave evidence of the presence of nickel of such a produce as to be very lucrative, other rich deposits afterwards being found in the same district. At present, however, all efforts are applied to two points Canala and Houailon, where the mineral is exceptionally rich, and the mines already fully at work. For the development of its mineral resources New Caledonia is much indebted to Mr. Higginson, who set the first gold mine to work there, first sent the nickel to Europe to ascertain its market value, and erected the first blast furnace at Noumea for the reduction of the nickel ore. The French Government have recognised the value of his exertions by granting him letters of naturalisation, and hopes are generally expressed that other distinctions will be bestowed upon him. Almost equal merit is due to Mr. Hauckar, an Australian, who has given a very great impetus to nickel mining, both on account of the capital he has taken into the country, and the knowledge which he has brought to bear in the reduction of the mineral. But at present all the hopes are concentrated on nickel, and it is generally felt that if nickel mining does not succeed New Caledonia may be put in the grave—at least, for a long time to come. The result, however, will soon be known, for Mr. Higginson has just shipped 500 tons from Noumea direct to Havre, estimated to give 10 per cent. produce, and to be worth 50*l.* per ton, or 25,000*l.* for the parcel, whilst the cost of raising does not exceed 20*l.* to 25*l.* per ton, leaving a large margin for freight, contingent expenses, and profit. The arrival and sale of the parcel will be looked forward to with much interest.

ANTIMONY.—Mines of antimony abound in California and Nevada. Hitherto, like borax, the sources of supply have been few, and the uses have been restricted in consequence. A thousand tons have been the extent of the yearly market in Europe and America. We have but one person in California engaged in reducing the ores, and he buys only such as contain about half metal. Until lately it was said that it would not pay to work the borax beds of California, because the market would be overstocked. But experience proves that increased supply forces it into new uses, and the manufacture pays. Now, it is fair to suppose that like causes will produce like results in antimony. For public information we present some facts which may be interesting. Antimony is in most ores combined with lead, silver, gold, copper, &c. Its chief uses at present are as follows:—About one-fourth part is mixed with lead, tin, &c., in making type metal, to which it imparts hardness. It has the property of swelling a little on cooling, and this makes a more perfect copy of the mould. Antimony is an essential ingredient in Babbit metal, britannia and friction surfaces. It makes a bronzing for plasters casts, paper mache ornaments, &c. It makes a coating for all metals, and for copper wire, to prevent them from oxidation. For electro plating and similar purposes it forms one pole of the electric battery. The British Government now uses antimony to increase the hardness of shot and bullets. Many valuable colours are made by combining other metals with it. Antimony is a proper cosmetic, and also a medicine in use among physicians of every school. It is also an ingredient in Britannia ware. Antimony has a very curious property, not hitherto found useful, but which may turn out to be of importance. When mixed with metallic magnesium, in proportion of 1-10th antimony, it forms an alloy which on exposure to air melts away like water. Pure antimony resembles silver in colour, but is less affected by exposure. When the casting comes from the fire, and is cooled, its disc is singularly beautiful. It is covered with dendritic crystallisations. To sum up, antimony serves us at our tea table, in war, in travel, in machinery, in painting, in testifying, in purifying glass, and in hardening metals. Every newspaper and every book pays tribute to antimony. There appears to be a wide field for expanded usefulness when antimony becomes cheap enough for inventive genius to study its possible application.—*San Francisco Weekly Chronicle.*

HYDRAULIC GOLD MINING IN CALIFORNIA—CEDAR CREEK.—The ditches of the Cedar Creek and Miners' Ditch Company are conveying their full capacity, all of which is being utilised to the best possible advantage. The Pacific claim has turned off and is cleaning up. The Polar Star, Summerset, and Miami claims have turned off, owing to the break in the Yuba ditch. All the claims heretofore mentioned as being in readiness are washing to good advantage. The miners are all sanguine that the balance of the season will fully atone for the heavy storms and loss of time. The Yankee tunnel which has not been driven for some time past—pending the construction of sluices between the Yankee and Badger shafts—is to be started up again and tunnelling resumed in a few days. Already men are at work clearing away the debris, laying track, &c. It is the intention of the superintendent to work the Baker claim this year, open up through a shaft, and commence washing therein next season. The ditch of the South Yuba Canal Company is broken again. The company has been very unfortunate this season, having had quite a number of breaks, entailing much expense, besides the of loss water to the company, and loss of time to the miners who are purchasing water therefrom.—BRIDGEPORT CHRONICLE. A blast of 300 kegs of powder was exploded in the Nescee and West, at You Bet last week that did splendid execution.—*Dutch Flat Forum*, April 20.

ECONOMISING STEAM.—The invention of Mr. J. TWIBILL of the Fuel Economiser and Engineering Works, Manchester, consists, first, in having water heaters for steam-boilers composed of rectangular blocks of vertical or angled pipes erected on one or both sides of a main return water current filter pipe; with the lower ends of each set of pipes jointed to lower horizontal connecting pipes, and the upper ends to branches on the upper connecting horizontal pipes; both these upper and lower pipes being connected by one main branch to the upper and lower part of the return current filter pipe. The cold water is fed in at the level of the lower horizontal connecting pipes, and led to and from the boiler to the upper and lower parts of the return current pipe above the filter part, to give a return current from the lower part of the boiler. The sludge blow-off pipe from the lower part of the filter is carried back through below the steam-boiler, and has a small close chest fitted to it, open at top into the middle part of the boiler bottom, with its lower open end led into the chest from a large filter shaped mouth at the surface of the water for collecting and drawing off the scum down into the chest. This chest would also collect the heavy dirt from the lower part of the boiler, and being in the line of the blow off pipe would be cleaned out at each blow-off. The second part of the invention consists in making the furnace fire grates much longer than usual, with an extra short inclined smoke box grate rising towards the extreme back of the furnace, and having a close wall in the ashpit near the middle of the grate, where the bridge is built close up to the top of the furnace. Fresh air is admitted through the furnace doors, and being heated ignites with the hydrocarbon gasses of the coal, and passes down through the fire grate bars at the back of the ashpit wall, thence up and along the flue behind the close wall or bridge, and in doing so heats the smoke grate box at the extreme back of the fire, where any remaining smoke in abutting against this back wall will curl or droop down through this angled grate, and be burned before passing down, so that nothing but flame and hot fire gases pass along to heat the boiler, and the production or escape of smoke is thus effectually prevented.

BLAKE'S PATENT STEAM PUMP.

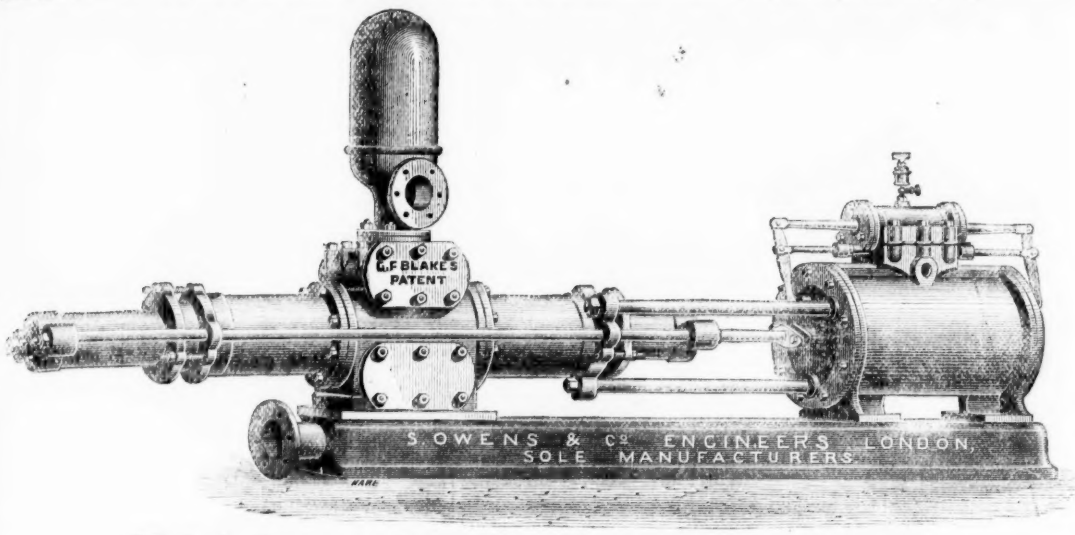
MORE THAN 8000 IN USE.

SOLE MAKERS FOR GREAT BRITAIN,

S. OWENS & CO,

Hydraulic and General Engineers, Whitefriars-street, London;
And at 195, Buchanan-street, Glasgow (W. HUME, AGENT)

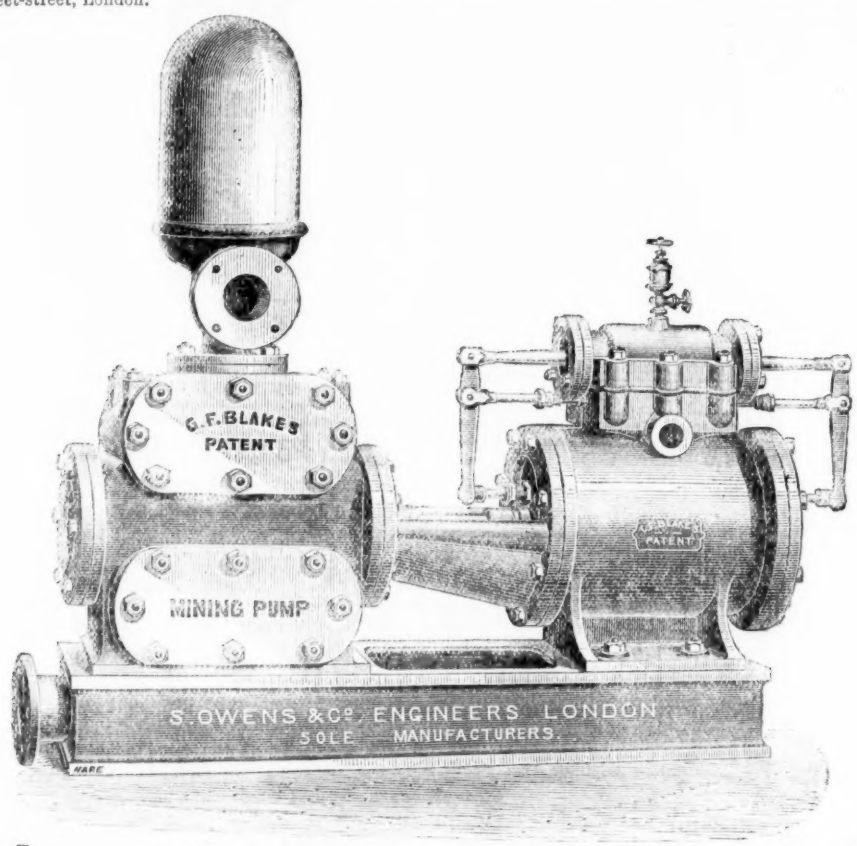
These PUMPS from their SIMPLICITY, RELIABILITY, DURABILITY, and ECONOMY are SPECIALLY SUITED FOR MINING PURPOSES, where large quantities of water require to be raised from great or medium depths with CERTAINTY. They are double-action in their construction, throwing a constant stream of water, can be made of any stroke to suit the space in which they have to work, can be arranged with any combination of steam and water cylinders to suit the pressure and lift against which it is desired to work them, are made of the very best materials and highest class of workmanship, and all working parts can be readily got at by any ordinary workman, and replaced if necessary by a duplicate part (all such being interchangeable) in the shortest possible time. For situations where gritty and sandy water has to be pumped the DOUBLE-PLUNGER PATTERN is recommended. Where space is limited the PISTON PUMP is better suited, a novel feature of which is the PATENT REMOVEABLE LINING, which can be removed in a few minutes and substituted with a new one, without disturbing any other part of the pump.



Blake's Improved Double-plunger Steam Pump.

S. OWENS AND CO.,

in placing the BLAKE STEAM PUMP before the mining world, believe they are offering the BEST, MOST RELIABLE, and ECONOMICAL PUMP that has yet been made, and solicit an inspection of various sizes in operation at their works, Whitefriars-street, Fleet-street, London.



Blake's Improved Mining Pump, with Patent Removeable Lining to Pump Cylinder,

Any combination of these Pumps may be had to suit circumstances. The following are some of the SIZES SUITABLE FOR MINING PURPOSES:—

Dia. of steam cylinders.. In.	12	12	12	12	14	14	14	16	16	16	16	18	18	18	18	20	20	20	20	24	24
Dia. of water cylinders.. In.	3	4	5	6	4	5	6	4	5	6	8	4	5	6	8	5	7	8	9	6	8
Length of stroke ..... In.	18	18	18	24	24	24	24	24	24	24	24	24	30	30	30	30	30	36	36	36	42
No. of strokes per minute..	30	30	30	30	25	25	25	22	22	22	22	22	22	22	22	20	20	17	17	17	15
Quantity in gallons per hour, approxmately ...	1440	2610	4260	5940	2940	1620	3600	2646	4158	5940	10620	2646	5160	7500	15360	4586	9000	12360	15660	6720	20

PRICES FOR THE ABOVE, OR ANY SPECIAL SIZE, AND ILLUSTRATED CATALOGUES FURNISHED ON APPLICATION.

PATENT CONDENSORS

Can be supplied for any size pump to effect a saving of fully 30 per cent. in the consumption of fuel, greatly increasing their efficiency

The Blake Pump will work under water, and as efficiently with compressed air as with steam.

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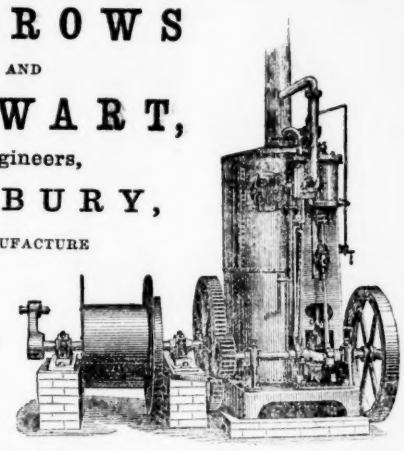

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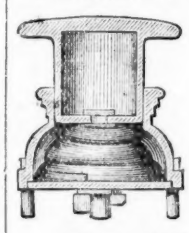

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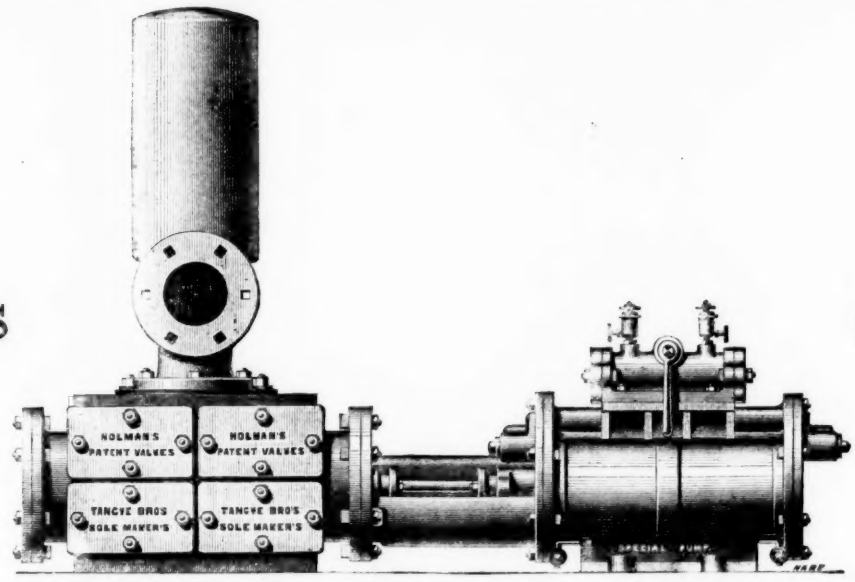

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The following sizes are suitable for low and medium lifts:—

Diameter of Steam Cylinder ...In.	3	4	4	4	5	5	5	6	6	6	6	7	7	7	7	7	8	8	8	8	8	9	9	9	9	9	10	10
Diameter of Water Cylinder ...In.	1½	2	3	4	3	4	5	3	4	5	6	3	4	5	6	7	4	5	6	7	8	5	6	7	8	9	5	6
Length of Stroke .....In.	9	9	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	18	12	12	12	18	24	12	18
Gallons per hour	680	815	1830	3250	1830	3250	5070	1830	3250	5070	7330	1830	3250	5070	7330	9750	3250	5070	7330	9750	13,000	5070	7330	9750	13,000	16,519	5070	7330
Price ....£	**16**	**18**	**20**	**25**	**22 10**	**27 10**	**32 10**	**25**	**30**	**35**	**40**	**30**	**35**	**40**	**45**	**50**	**40**	**45**	**50**	**55**	**65**	**50**	**55**	**60**	**70**	**85**	**55**	**60**

CONTINUED.

Diameter of Steam Cylinder..In.	10	10	10	10	12	12	12	12	12	12	14	14	14	14	14	14	16	16	16	16	16	18	18	18	18	20	20	20
Diameter of Water Cylinder..In	7	8	9	10	6	7	8	9	10	12	7	8	9	10	12	14	8	9	10	12	14	9	10	12	14	16	12	14
Length of Stroke .....In.	12	18	24	24	18	18	18	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24
Gallons per hour	9750	13,000	16,519	20,000	7330	9750	13,000	16,519	20,000	30,000	9750	13,000	16,519	20,000	30,000	40,000	13,000	16,519	20,000	30,000	40,000	16,519	20,000	30,000	40,000	50,000	30,000	40,000
Price .....£	**55**	**75**	**90**	**100**	**75**	**80**	**85**	**110**	**120**	**140**	**110**	**120**	**130**	**140**	**160**	**180**	**140**	**150**	**160**	**180**	**200**	**190**	**200**	**220**	**240**	**260**	**220**	**240**

Intending purchasers of Steam Pumps would do well to observe the great length of stroke, short steam cylinder, and short piston of the "Special" Steam Pump, as compared with the short stroke, long steam cylinder, and long piston of the Pumps of other makers, as the efficiency and durability of the machine, and the space occupied by same, greatly depend upon this. The advantage of long strokes will be obvious when purchasers are reminded that each set of suction and delivery valves of a "Special" Steam Pump with 24 in. stroke, running at 120 ft. per minute, would open and close only 30 times per minute, as against 120 times per minute in a Pump with only 6 in. stroke performing same duty.

The "Special" Steam Pump can be worked by Compressed Air as well as by Steam.

HUNDREDS of these PUMPS are USED for HIGH LIFTS IN MINES, for which purpose they are made with 21, 24, 26, 28, 30, and 32-inch Steam Cylinders, and 36 48 and 72-inch Strokes.

Holman's Patent Self-acting Exhaust Steam Condensers,

FOR ALL KINDS OF STEAM PUMPS AND HIGH-PRESSURE STEAM ENGINES.

TURNS WASTE STEAM INTO GREAT POWER.

REQUIRES NO THREE-WAY COCKS, CHECK, or REGULATING VALVES.

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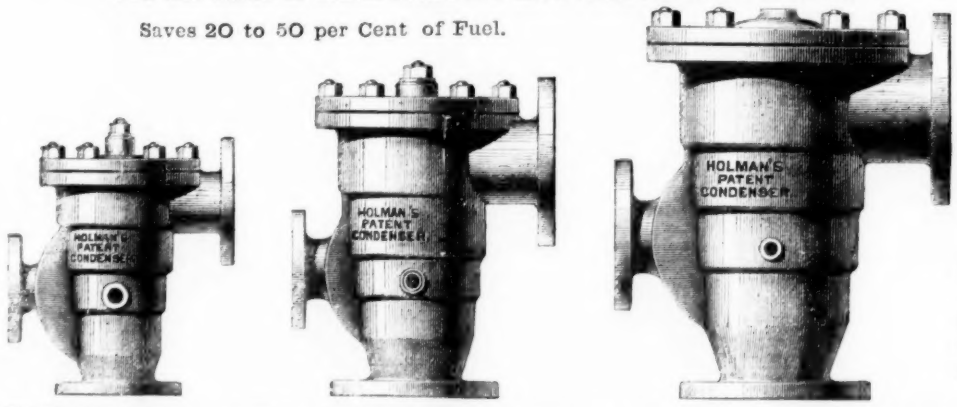

These Condensers are made to suit any size and kind of Steam Pump. They form a part of the suction pipe of the Pump, and while they effectually condense the exhaust steam they produce an average vacuum of 10 lbs. per square inch on the steam piston, increasing the duty of the Engine, and effecting a saving in fuel of from 20 to 50 per cent.

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All Boiler Feeders are recommended to be fitted with these Condensers, as not only is the exhaust steam utilised in heating the feed water, but is returned with it into the boiler.

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Messrs. TANGYE BROTHERS AND HOLMAN.

GENTLEMEN,—I have great pleasure in recording my entire satisfaction with the working of the Holman's Patent Steam Pump Condenser which you have supplied to us. The complete condensation of the steam is, apart from its value in the strict economic sense, a most valuable feature in the drainage of underground workings. The perfect manner in which this important result is accomplished by your Condenser is extremely creditable to you, and merits the thanks and commendation of the Mining Engineer. When we start the "Special" Steam Pump the Condenser commences working automatically, and maintains a constant vacuum of 10¾ lbs. per square inch, even when we run the Pump upwards of 80 strokes (106 feet) per minute. It may perhaps be interesting to you to know that when we were running the Pump at 84 strokes (168 feet) per minute, the steam gauge indicating a steam pressure of 36 lbs. per square inch, 80 yards from the Pump, and the Condenser vacuum gauge on the exhaust pipe indicating a steady vacuum of 21½ inches, I turned the exhaust steam from the Condenser into the atmosphere, when the speed at once fell to 44 strokes per minute. The working economy thus shown is really so great that the cost of the Condenser must be saved in a very short time.

(Signed) J. THOMPSON.

Price from 30s. to 40s. per inch diameter of Steam Cylinder, according to the relative Diameter of Pump for which Conden er is required.

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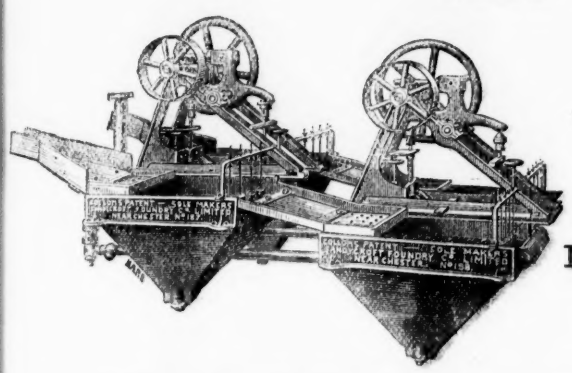

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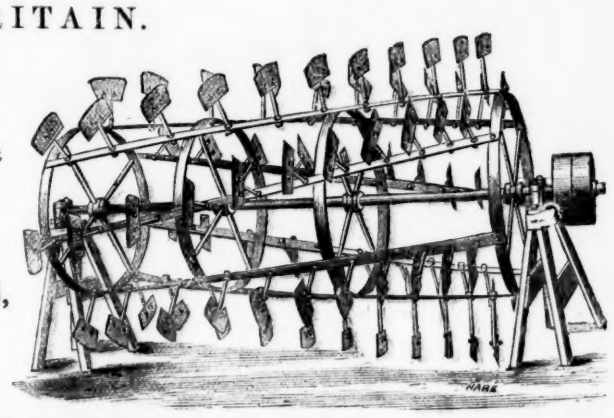

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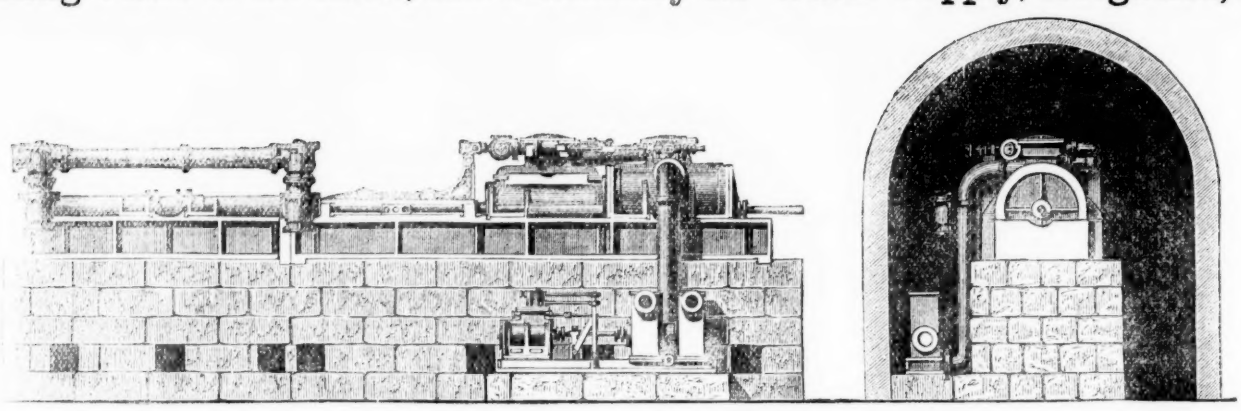

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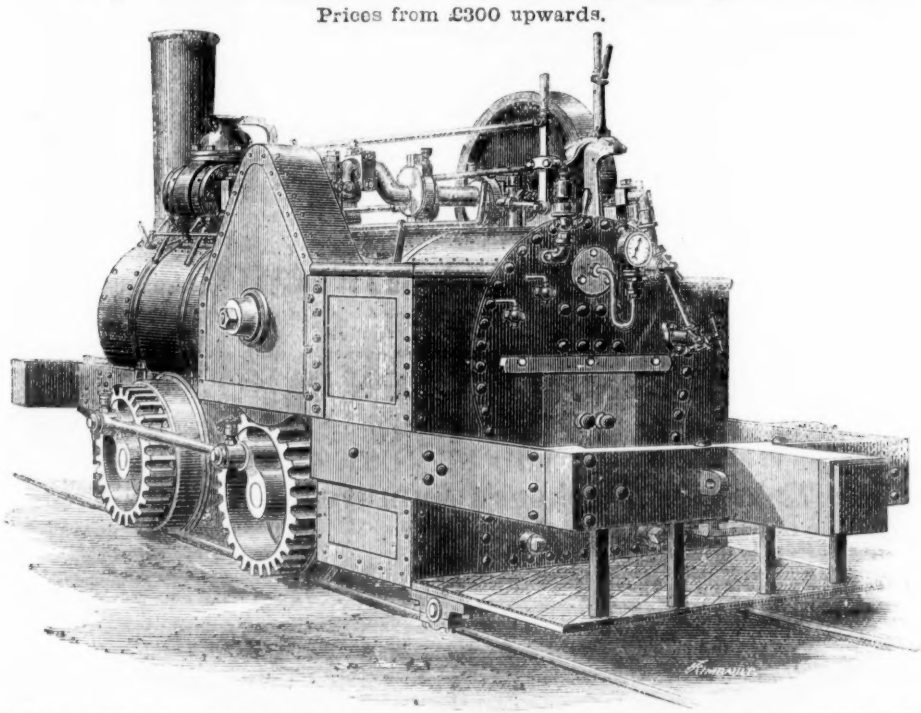

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For Tunnels, Mines, Quarries,

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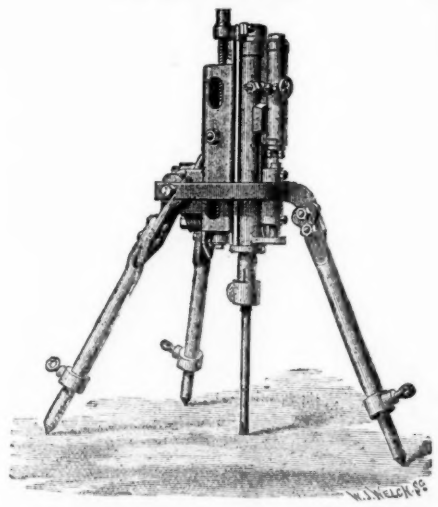

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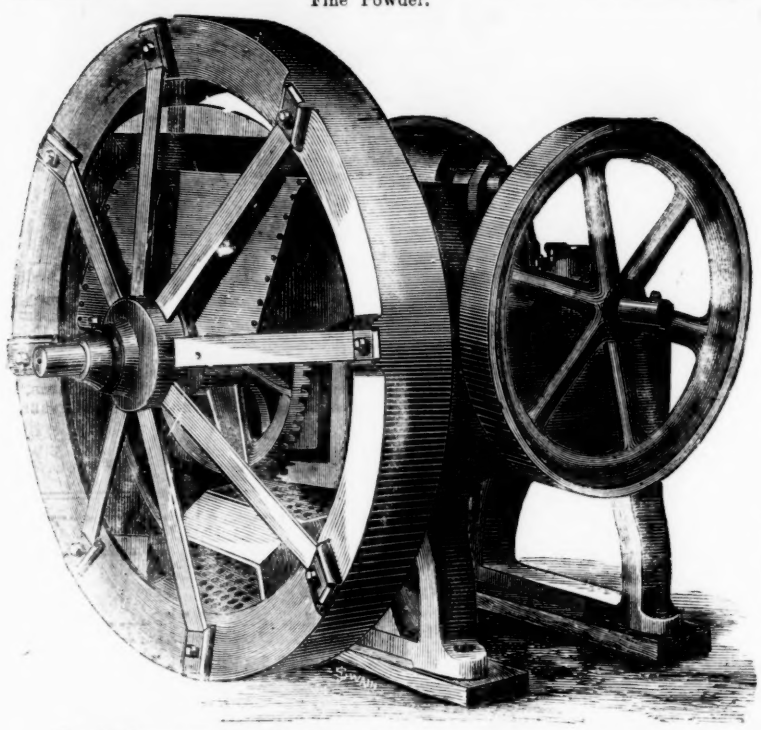

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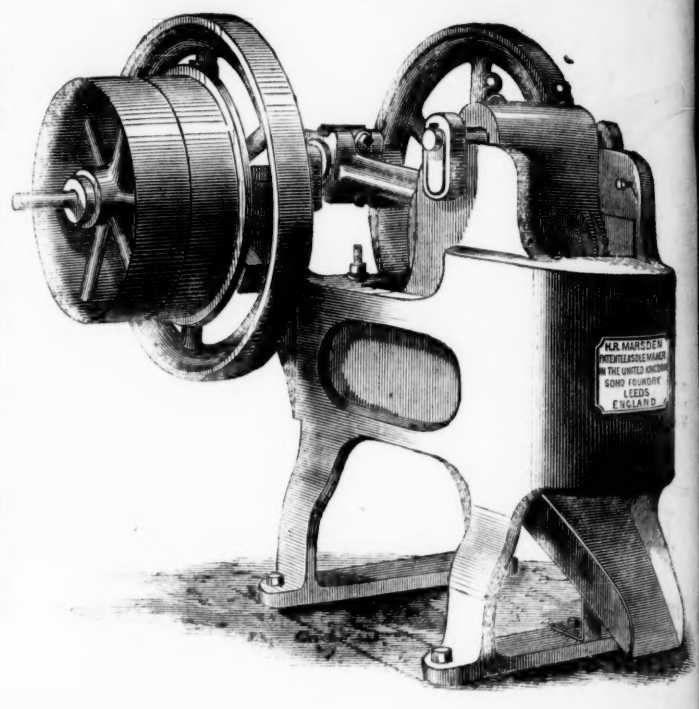

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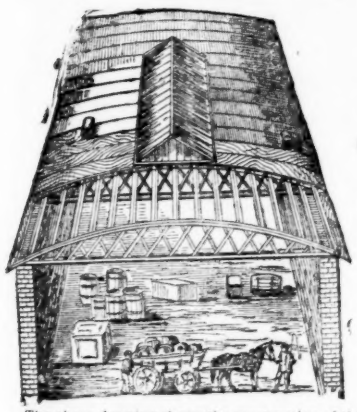

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The above drawing shows the construction of this cheap and handsome roof, now much used for covering factories, stores, sheds farm buildings, &c., the principal of which are double bow and string girders of best pine timber, sheeted with ½ in. boards, supported on the girders by purlins running longitudinally, the whole being covered with patent waterproof roofing felt. These roofs so combine lightness with strength that they can be constructed up to 100 ft. span without centre supports, thus not only affording a clear wide space, but effecting a great saving both in the cost of roof and uprights.

They can be made with or without top-lights, ventilators, &c. Felt roofs of any description executed in accordance with plans. Prices for plain roofs from 30s. to 80s. per square, according to span, size, and situation.

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INODOROUS FELT for lining damp walls and under floor cloths.

DRY HAIR FELT, for deadening sound and for covering steam pipes, thereby saving 25 per cent. in fuel by preventing the radiation of heat.

PATENT ASPHALTE ROOFING FELT, price 1d. per square foot.

Wholesale buyers and exporters allowed liberal discounts.

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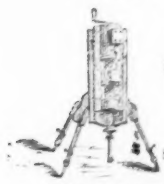

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PUMP LEATHER
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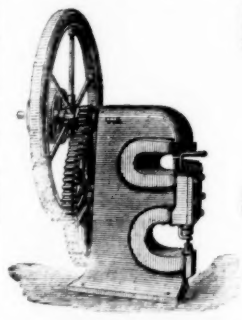

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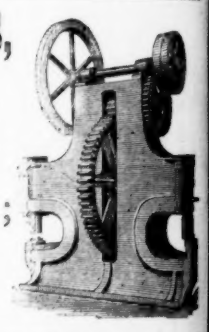

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